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GAMING HEADSETS
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- SLOW SSD PERFORMANCE
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- WINDOWS SLEEP ANNOYANCES
- AND OTHER VEXING ISSUES—FIXED!

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AVENGED!

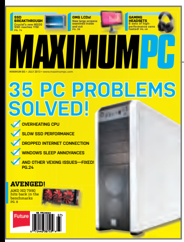
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Mark Madeo



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Gordon Mah Ung

STOP THE WINDOWS 8 HATE

AFTER SIX MONTHS of using it (including the previews), I've fully mapped out the five stages of Windows 8 adoption: Denial. Confusion. Anger. Depression. Acceptance.

First comes denial. "I mean, really, the Start button isn't really gone, is it? It can't be. Medic! Don't die on me you son of… ! *Nooo!!!*"

Confusion then sets in. Whether you're an octogenarian octocore-overclocker or a skinny-jeaned hipster sitting in a café with an Ultrabook, confusion will reign. "Wait, why does it keep going to full screen? How do I get this to dock? How do I shut down the PC? How come the app controls aren't uniform? How do I close apps? Wait, Modern apps are different than desktop apps? Huh, what?"

The longest stage is anger, which I'm betting the vast majority of users are still in. It lasts for months and will occasionally simmer over into bouts of screaming at the screen, murderously gripping your mouse, and pounding on that innocent victim—your keyboard—until keys pop off. "Why is it so hard to reboot my computer?!" "If I had an actual Windows 8 disc, I'd smash it to bits! Wait, I'll actually burn a Windows 8 ISO to disc and then smash it!"

Eventually, depression sets in. Hell, what else explains dismal PC sales this last quarter? Many analysts (and PC makers) blame Windows 8 for putting the plane into a nose dive.

The good news, I'm happy to report, is that eventually acceptance sets in. I spent months in the anger stage and additional time wallowing in despair and depression. On a recent new desktop box at home, though, I had the option of going with Windows 7 or Windows 8, and actually opted for Win8. I installed the Enterprise version and didn't initially activate it because I wanted to see if I could stand it on my primary gaming and content-creation box without a touchscreen. In the end, however, I committed, and, amazingly, I'm OK with my choice.

I even opted to stick with the much-hated Modern UI because I wanted to suffer as others have. While I'm a bigger fan of Windows 8 when paired with a touchscreen, the lack of a touchscreen on this gaming box hasn't been a deal-breaker. How did I go from foaming-at-the-mouth anger and deep despair over Windows 8 to a level of acceptance? I've really started to appreciate all the little things Microsoft has done to the OS. The Windows Task Manager, for example, is one of the more accurate tools for determining my machine's current clock speed. I've put it against Intel's own utilities and it's been spot on. Switching back to the Windows 7 Task Manager feels like I'm in Windows XP or Vista. My new SSD needs to be Trim'd? Not a problem with Windows 8, either.

There are enough improvements to Windows 8 that at this point in my life, I've decided to accept it, and maybe even prefer it.



Gordon Mah Ung is Maximum PC's deputy editor, senior hardware expert, and all-around muckraker.

submit your questions to: comments@maximumpc.com

THE NEWS

AMD Radeon HD 7990 Benchmarked

Just as fast, and as quiet, as Nvidia's GTX 690



Included in the $1,000 price tag is an eight-game smorgasbord of Triple A titles like Crysis 3, Far Cry 3, and BioShock Infinite.

Last month, we gave you the first glimpse of AMD's new dual-GPU Berzerker, the HD 7990. At the time, we weren't allowed to talk about performance, benchmarks, how noisy it was (or wasn't), or anything beyond what was in the press materials. Yeah, we hate that too, so we're happy to report that this month we're able to bring you a full report on this Godzilla-size GPU.

To recap: The card's specs include dual–HD 7970 GPUs clocked at 1,000MHz, 3GB of RAM per GPU, dual 8-pin power connectors, and a 375-watt TDP. This is 75W higher than Nvidia's comparable dual-GPU card, the GeForce GTX 690. It's also one inch longer, though both use two 8-pin PCIe power connectors. Temps on the dual-slot card are managed by an incredibly long heatsink with copper heat pipes that are cooled by three fans. Just as long as the heatsink is the list of games that are included with the card: Crysis 3, Far Cry 3, BioShock Infinite, Tomb Raider, Hitman Absolution, Deus Ex: Human Revolution, Far Cry 3 Blood Dragon, and Sleeping Dogs.

Its price is the same as the GTX 690—$1,000—and in our benchmark tests we found the two cards to be neck-and-neck in terms of overall performance and noise output, though the Radeon card did suck down a bit more power. AMD claims in its marketing materials that the HD 7990 is both faster and quieter than the GTX 690, but in our tests, the cards were very evenly matched. You can see a full rundown of our benchmark results at MaximumPC.com (http://bit.ly/hd7990).

The main area of difficulty for the HD 7990 is CrossFire, both in scaling as well as micro-stutter, where the GPUs send frames to the system at irregular intervals, resulting in choppy gameplay. We noticed some stuttering in some games, most notably in Crysis 3 and Far Cry 3, but it wasn't as pronounced in other titles. AMD has promised a software fix for this issue, but it probably won't be available until this summer. That's a problem, as is the fact that two Radeon HD 7970 cards are just as fast for $200 less, so you'd most likely only be interested in this card if you didn't have the room for dual cards and want the game bundle. If AMD can smooth out the CrossFire issues in the near future, AMD will have a real contender on its hands, but until then, proceed with caution. **–Josh Norem**

BENCHMARKS

	Radeon HD 7990	EVGA GTX 690	HD 7970 CF
3DMark Fire Strike	9,639	9,448	**11,109**
Unigine Heaven 4.0 (fps)	**42**	38.9	**42**
Crysis 3 (fps)	45	31	**48**
Shogun 2 (fps)	**59**	61	55
Far Cry 3 (fps)	**50**	48	35
Metro 2033 (fps)	34	29.6	32
Batman: Arkham City (fps)	97	**109**	92

Best scores are bolded. Our test bed is a 3.33GHz Core i7 3960X Extreme Edition in an Asus P9X79 motherboard with 16GB of DDR3/1600 and a Thermaltake ToughPower 1,050W PSU. The OS is 64-bit Windows 7 Ultimate. All tests are run at 1920x1080 with 4X AA except for 3DMark and Catzilla.



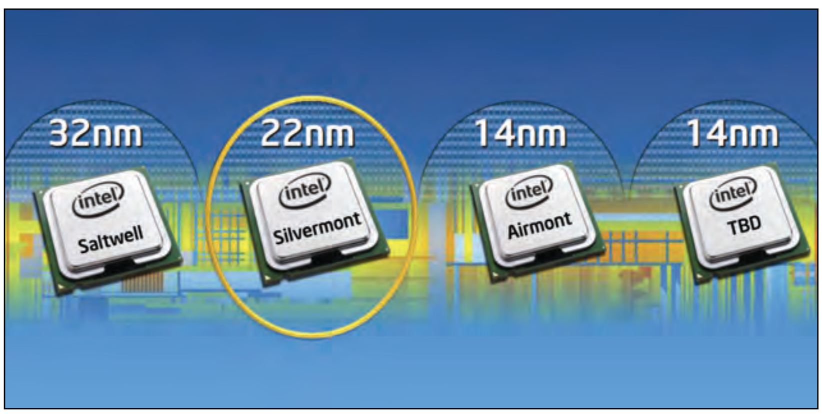
Corsair Not for Sale

Rumors flew in late April that Corsair—the popular maker of power supplies, cases, CPU coolers, and other components—was up for sale and had found a buyer. Specifically, the private equity firm Francisco Partners. However, Rick Allen, Corsair's director of public relations, was quick to clarify the situation. Francisco Partners was giving the company $75 million, but it was an investment providing Corsair with cash flow to make acquisitions. According to Mr. Allen, Corsair is profitable right now and has not taken outside money before in its 19 years of operation; the IPO they had considered would have brought lots of cash, but they believed that the market wouldn't give them the stock price they wanted. **–PL**

Is DirectX Done?

AMD vice president of global channel sales, Roy Taylor, told German website Heise.de that he expects DirectX 11 to be the last version that Microsoft ever produces. Taylor said AMD's next-generation GPUs will integrate "other technologies" to take its place, though he didn't divulge any info on what those technologies might be. It's not clear if he was referring to the GPU in the upcoming PlayStation 4 console, or the Radeon HD 8000–series GPUs for desktop computers that will reportedly arrive at the end of 2013.

Microsoft said earlier this year that "DirectX is very much an important and evolving technology," in response to a rumor that it had circulated an email saying the opposite. **–PL**



Next-Gen Atom to Smash ARM?

Intel announced in May that it would release completely redesigned Atom CPUs, its line of low-power mobile chips. Code-named Silvermont, these new CPUs will do away with the slow in-order design in favor of a more traditional out-of-order design that Intel has used since the Pentium Pro.

While previous Atoms have gotten low priority in process technology, Silvermont will be on the latest 22nm transistors and move to a "tick-tock" model, which means newer, faster, less power-hungry iterations will come out at an even faster rate. According to Intel, between the process shrink and major microarchitecture changes, Silvermont will have three times the performance of current Atom parts and use up to five times less power, too. **–GU**



Tom Halfhill
Fast Forward

THE DRIVERLESS HORSELESS CARRIAGE

YOU GOTTA love technology. Every solution seems to cause a new problem, which then inspires another solution, which causes yet another problem. I'd conclude that engineers are as skillful as lawyers at perpetuating their own profession, except I don't want to insult the engineers.

Consider text messaging. It's a great solution for people too busy to answer email or make phone calls, but it's yet another distraction for drivers who are too busy to watch the road. Google's solution? Self-driving cars.

Google has made surprising progress on this difficult challenge. The company's self-driving cars are frequently seen plying the streets and highways of Silicon Valley and other locales. (California is one of three states to legalize these experiments, as long as the robotic cars have human drivers who can intervene.) Semiconductor companies are eagerly watching this progress, because autonomous autos need more processing horsepower to harness their internal-combustion horsepower. Already, conventional cars have upward of 100 microprocessors supervising everything from engine control to infotainment systems.

Auto industry experts tell me the main obstacles are no longer technical. One roadblock is legal: Who is liable if a self-driving car causes an accident? Another is psychological: Will people familiar with the Blue Screen of Death on their PCs ever entrust their lives to a computer-controlled car?

On the second question, I have two theories. Although young people are usually the early adopters of new technologies, I think the elderly will lead the way this time. As their driving skills fade, they will welcome robotic cars that prolong their mobility and independence.

For everyone else, I predict that private-sector regulation will dictate the adoption curve. When (not if) robotic cars establish a superior safety record, insurance companies will begin hiking premiums for human drivers. Eventually, most of us will be priced out of the driver's seat.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.



Thomas McDonald

Game Theory

THIS COLUMN IS ABOUT EA AND SIMCITY

SOMETIMES REVIEWERS slip a little bit of politics into their game writing. This month, I'm going to slip a little bit of gaming into a political column.

I used to be a dues-paying Libertarian Party member. I felt that libertarianism was a useful counterbalance to the ever-expanding state, which was seizing more and more power at the cost of freedom and individual responsibility. In time, I saw that libertarianism only got it half right. Big Government was not the only problem. Big Business was, as well. Both those things have a single word in common, and you've already spotted it: "big."

Bigness is bad. Anything—be it a state or a corporation—can become too large to function properly. As either a government or a corporation grows, it becomes less and less about its original mission and more and more about merely sustaining itself. The expansion pushes the leadership further away from productive action, creating a vast gulf between what an entity *should be* doing, and what it actually *is* doing.

In time, the need to sustain itself becomes the prime goal of the entity. With government, the vision moves from public service to winning elections. With corporations, it moves to quarterly reports and stock prices. We're told that being "goal oriented" is always good, but that depends upon the goal. If your corporation's goal is merely to ship a product in order to keep from posting a quarterly loss, regardless of whether or not the product is done or even functional, then you're pursuing the wrong goal. Or, to be more precise, you may pursuing the right goal in the wrong way.

As key decisions are made further and further away from the point of production, the leadership class loses all sense of mission. It becomes bloated and muscle-bound, unable to see its own failings until it's too late. That's how giants fall. And in their falling, their long shadows fade, creating fertile and sunlit ground where fresh new things can grow.

You can follow Thomas McDonald on Twitter: @StateOfPlayBlog.

Android OS in Laptops?

Intel executive vice president and chief product officer, Dadi Perlmutter, told CNET in April that we should expect to see $200 notebooks in the coming months… running Android instead of Windows. This comes on the heels of Intel announcing its intent to cut the price of its low-power Atom CPUs to compete against ARM CPUs, which have been very popular in mobile devices lately. Google does not charge for an Android license, which saves manufacturers a chunk of money, and it has a large library of apps. It also has the potential to consume less power than Windows. Android currently does not ship as a desktop operating system, though Google's Chrome OS is very similar. **–PL**

Razer Honors 90-Percent-Off Coupon

In April, an unnamed third party created a 90-percent-off coupon to test the online shop for Razer, maker of gaming mice, keyboards, and the recent Edge tablet. The coupon code went viral, resulting in thousands of orders being placed in the span of just a couple of hours. Nevertheless, Razer said it would honor the discounted orders that were placed.

To limit the damage to its bottom line, Razer said those who had used the coupon code to purchase multiple units of a single product would only be able to apply the discount to one of those units. Razer said it could take months to process the deluge of orders. **–PL**



Tech Tragedies and Triumphs

A monthly snapshot of what's up and down in tech

TRIUMPHS

THE INTERNET
World Wide Web turns 20 years old. Thanks for the cat pics!

ANDROID
Google's upstart OS snags massive market share from apple.

INTEL
Haswell release date confirmed, upgraders worldwide prepare.

GOOGLE
It finally adds offline support to Google Docs.

TRAGEDIES

AMD
CrossFire frame-interval issue hampers HD 7990 launch.

LEAP MOTION CONTROLLER
Tantalizing motion controller delayed, again.

EA
Named "Worst Company in the World," for the second time.

MICROSOFT
Intel disses Windows by announcing Atom-based laptops with Android OS.



Quinn Norton
Byte Rights

THINK OF THE ORPHANS

COPYRIGHT LAW makes for strange circumstances. This is because it's a monopoly designed to let creators make money, but the vast majority of everything that's copyrighted isn't for sale anymore, if it ever was. Everything is fully protected from the moment it's created, regardless of its creator's intent. But most of what copyright law touches is never commercial, and even the exceptions are rarely commercially viable for long.

That leaves most human creations in a legally untouchable gray zone. We want to preserve them, or even sometimes use them, but we can't touch them until they fall into the public domain. These lost 20th-century works are called orphans, and this quirk of copyright law is why more books are in print from 1850 than 1950. Often, there is nothing to do but wait. In the meantime, innumerable artifacts of human expression fade away, sometimes literally, as the physical media that holds them decays over time.

No one likes this problem, and legislators have been trying to fix it for a while. But no one likes the fixes, either. The UK is taking a stab at it with the Enterprise and Regulatory Reform (ERR) Act. This allows the use of orphan works, if their creators cannot be found and if a market-rate fee has been paid to a holding organization in case the creators appear. The idea of a diligent search is still undefined (as is what happens to unclaimed money), and it still doesn't solve the problems of archiving mass content for future generations, but this is a step in the right direction. Copyright is complex, and it's genuinely hard to make it work in the digital age. But there's so little effort to even try that this is fantastic news, and something we'd do well to keep an eye on.

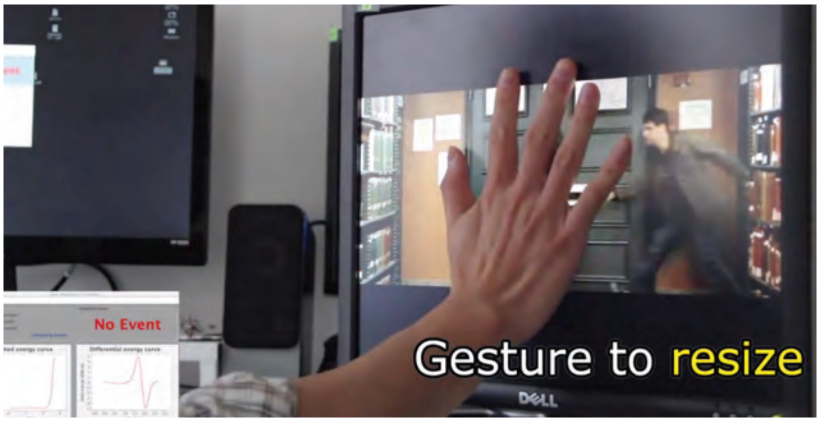
Quinn Norton writes about copyright for Wired News and other publications.

$5 Sensor for Touch Input?

Tech website ExtremeTech.com recently reported that researchers at the University of Washington have figured out how to enable touch input on a standard LCD monitor, using nothing more than a $5 sensor with some software they designed. They call the system "uTouch." The technology has some noticeable latency, so it wouldn't replace the kind of touch interface that we see on cell phones and tablets. And it's apparently not sensitive enough to draw or write on the screen. It would probably be used for wall-size displays that would be prohibitively expensive if they used current touch-sensing tech. Still, it's a pretty impressive proof of concept.

Basically, the electrical power that your household items use creates a specific profile or signature, and this can change with very minor fluctuations—even touching your computer screen. And this screen has a grid of circuitry with power that can change according to the proximity of your hand. The wizards at UW have fine-tuned the sensor to detect various gestures, such as five finger tips touching, the palm of your hand resting on the screen, your palm pushing the screen, and your hand pulling away.

Curious readers can get the full research paper in PDF from the university's website, at http://emmanuel.cs.washington.edu. Although the researchers at UW's Ubiquitous Computing Lab say they're not going to sell products based on uTouch, it uses cheap off-the-shelf parts, and the paper details all the math they programmed into the system. So, it could be reproduced by a third party. They also have a demo video available on YouTube. **–TM**



AMD Beats the Street

AMD's finances beat expectations in Q1, earning $1.09 billion, with an operating loss of $98 million and a net loss of $146 million, or $0.19 per share. A year ago, AMD was reporting a net loss of $580 million, or $0.80 cents per share. In Q4 last year, the company lost $473 million, or $0.63 cents per share.

AMD's Computing Solutions segment revenue decreased 9 percent sequentially and 38 percent year-over-year, during the worst year-on-year decline in almost two decades, according to data by International Data Corporation (IDC). Rival Intel saw its PC Client Group revenue decrease 6.6 percent sequentially and 6 percent year-over-year, but earned a Q1 profit of $2 billion. **–PL**

PhysX Makes a Splash

In April, Nvidia GPU wizards Miles Macklin and Matthias Müller-Fischer announced that they had figured out how to use PhysX to render highly realistic water in real-time. Using a method called "Position Based Fluids," they managed to enforce constant density without making your computer cry. Up until now, we had two choices: render it in real time but let the water be "squishy" like a gas, or render it beforehand for a more realistic look (which can take a lot of time and computing resources). You can find the full details in their research paper published at blog.mmacklin.com. Example videos are also on YouTube. We like the one with the bunny rabbit. **–TM**

THE LIST

6 AWESOME SCREENSAVERS



6 LIVING MARINE AQUARIUM

Fish tanks are awesome, but they can be expensive and a pain to clean. Not so with the free Living Marine Aquarium screen-saver. http://bit.ly/13Q0itU



5 ZOMBIES

Love 'em or hate 'em, zombies are here to stay. Worry not about bites, however, because these harmless undead will only attack if you set them as your screensaver. http://bit.ly/YKjj0J



4 SURVEILLANCE

This self-described "haunting live soap opera," randomly streams footage from over 400 networked surveillance cameras worldwide. Makes you wonder who's watching *us*. http://bit.ly/163k8Gs



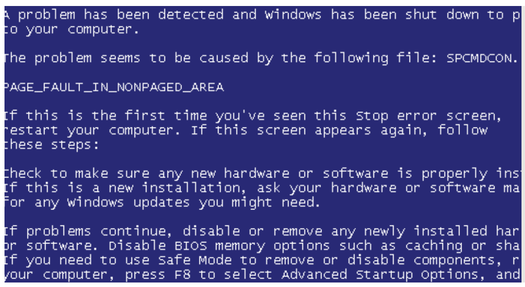
3 WIKIPEDIA

Wikipedia's screensaver will display a different page every time it kicks in. It can be highly educational, if also completely random. http://cnet.co/1a0sql



2 MATRIX BACKGROUND

You might not be the One as prophesied in the *Matrix* movies, but you can be the one to download this awesome screensaver. http://cnet.co/d0I3d4



1 BSOD

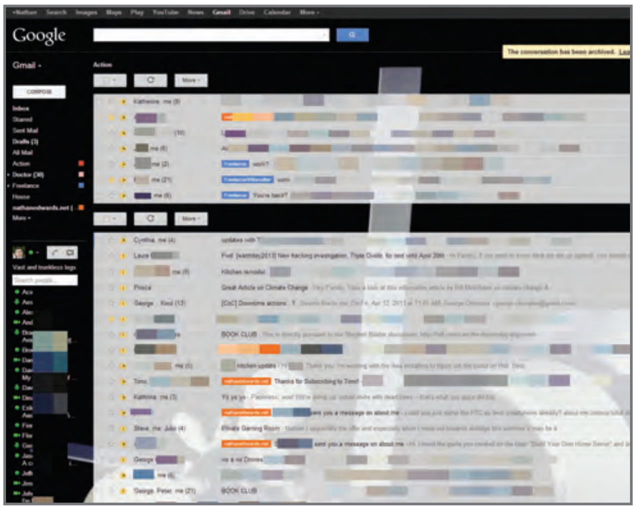
Every PC user knows how dreadful the blue screen of death is, but as a harmless screensaver, there's no reason to feel blue about seeing it. http://bit.ly/tDaY

HEAD TO HEAD

BY NATHAN EDWARDS

Gmail vs. Outlook.com

Your webmail inbox is the center of your online ecosystem, and not just for your primary email account, but for every other account you have that's connected to it. Which one's better? It's time for the battle of the webmail giants, and it'll be a doozy. In one corner, we have the Whale of Webmail, the defending champion inboxer: Gmail! In the other corner, the scrappy kid with a big name, the King of Clean, the Preview of Pain, Outlook.com!



Gmail's inbox is information-dense and extremely configurable, but too much information onscreen means info can get lost in the noise.

Round 1: Aesthetics

Outlook.com looks great. It's clean and simple in the Modern UI style: white background, black text, one bright color, low information density. It looks better than the desktop Outlook, and Outlook webmail, and it looks much better than Gmail. It's easy to configure the preview pane—you have to dig in the Labs section to find that in Gmail. On the other hand, customization is limited to changing the one color, and you only get 18 options there.

Gmail is more themeable—you can choose background images, color schemes, and even information density, but even at its most minimal it's more cluttered than Outlook.com. It's the same sort of cluttered as the Outlook desktop client—the price you pay for having a lot more information available at a glance. Gmail can look great or horrendous; Outlook.com just looks good all the time. It's close, but Outlook wins this round.

Winner: Outlook.com

Round 2: Email Experience

The Outlook.com composition window is large and clean and easy to use, but Gmail lets you compose a message in-line with the thread you're replying to, or in a pop-up window in the corner, so you can keep tabs on other messages or your entire inbox while you're writing.

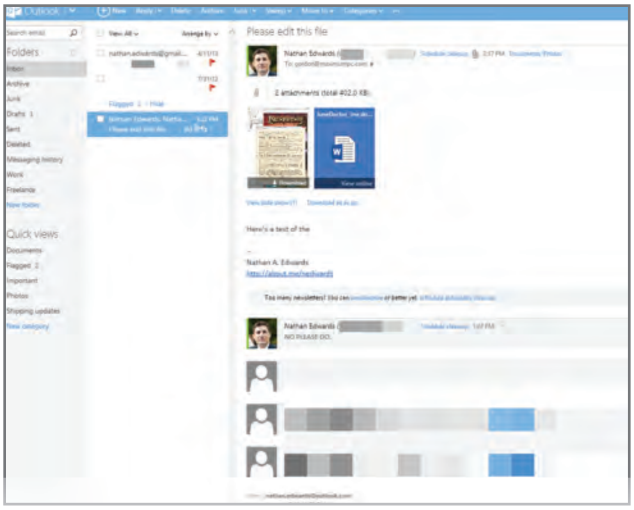
Both Gmail and Outlook.com offer robust tagging and sorting for messages, and both have enough keyboard shortcuts to be usable without a mouse. Gmail offers 10GB of storage; Outlook.com doesn't advertise a limit. Outlook.com also allows you to easily unsubscribe from bulk mail.

Outlook.com's Quick Views are fantastic, letting you easily find messages with photo or document attachments, tracking numbers, specific labels, or flags. Gmail's Label views can do the same, but take more manual setup.

Winner: Tie

HEAD

Outlook.com's inbox is clean and modern and has a preview pane by default, but offers much less usable information at a glance than Gmail's.



Round 3: Customization

There's just no contest here. If you can find the right settings to enable, Gmail is incredibly powerful. Priority Inbox does a frighteningly good job at sorting your email by importance, Send and Archive keeps your inbox tidy, and the Labs fix problems you didn't even know you had.

There are Labs settings to enable an Outlook-like preview pane, tweak the Chat interface, add calendar and documents widgets, even "undo" sending an email—which has saved our bacon once or twice. You can view multiple Label inboxes at once, play Google Voice messages in Gmail, and so much more. Outlook.com's customization is modest, and that's an understatement.

Winner: Gmail

Round 4: Ecosystem

Gmail ties into the enormous Google ecosystem, from Calendar to Drive to Google Accounts to Google Plus (meh). Outlook.com ties into your Microsoft Account—which you use for everything from Xbox Live to Office 365 to Skype to logging into Windows 8.

You can open Microsoft Office files on the web directly from your Outlook.com inbox, but you can do the same for Google Docs files in Gmail, and you can view Office documents (and convert them for editing) in Drive, as well. Outlook.com ties into SkyDrive and lets you send large attachments easily, while Gmail does the same with Google Drive. Gmail has Google Talk and Google Plus integrated, while in Outlook.com you can chat with your Facebook or Live Messenger friends. Each, of course, works best if you're heavily invested in its corresponding ecosystem, so we're calling this a tie.

Winner: Tie

Round 5: Accounts and Security

Both Outlook.com and Gmail connect via HTTPS by default, with 128-bit encryption, and both let you send and receive messages from POP3 accounts. Google also supports IMAP.

Gmail has had two-factor authentication for a long time now; Outlook.com doesn't—yet. Microsoft is reportedly working on it, and it may even be available by the time this issue is out. Two-factor authentication is essential for any online account you don't want hacked. Given that your Gmail and Outlook.com accounts tie into your entire Google and Microsoft ecosystems, anyone who gets your password can access your entire digital life—unless you have two-factor authentication enabled.

Finally, Google supports multiple sign-on, so if your work or personal website uses Google Apps, you can be signed into that as well as your Gmail account. Outlook.com doesn't. Yes, Google gets this round.

Winner: Gmail

And the Winner Is...

With ties in two rounds, **Gmail** only beats Outlook.com by one round. Google's offering has better security options, IMAP support, and more power under the hood—if you can figure out how to make it work. Outlook.com is clean-looking, ties into more social networks, and has useful features right out in the open with less tweaking. It can't match Google's eight-year head start, but it's catching up quickly.

DOCTOR

THIS MONTH THE DOCTOR TACKLES...

> Proprietary Connectors
> Gremlins
> PCIe Lanes

Lane Changes?

Hey Doc, I currently have an Asus M5A99X Evo R2.0 running dual XFX Radeon 7970 Black Editions in CrossFireX. That's dual–PCIe 2.0 x8 mode. Would the new Asus Sabertooth 990FX/Gen3 R2.0 give me any advantage in gaming? I mostly play first-person shooters like Far Cry 3, Tomb Raider, Assassin's Creed 3, and the like. I searched the web and it's a toss-up for little to no gain. Also, will the Sabertooth actually run dual-x16 in the PCIe 3.0 slots? I've read conflicting reports on the net. AMD fanboys want to know the truth!

—Garrett Franklin

THE DOCTOR RESPONDS: According to Asus's specs, the Sabertooth 990FX will indeed run two PCIe cards in dual-x16 mode. The question, though, is whether that makes a difference for your setup. PCIe 2.0 x8 runs at 4GB/s each way, while PCIe 3.0 x16 is 16GB/s each way—a fourfold increase. But does that actually make a difference in gaming with your setup?

Not really. TechPowerUp did a huge comparison using a Z77 board, a 7970, and a GTX 680 (http://bit.ly/J7a6Xd). They tested each card at PCIe 1.1, 2.0, and 3.0, and at x4, x8, and x16 lanes, in multiple resolutions across 18 games. They didn't test multi-GPU setups, but it's the biggest apples-to-apples comparison we could find.

The upshot? A single Radeon 7970 is about 3 percent slower at PCIe 2.0 x8 compared to PCIe 3.0 x16. We're talking between one and five frames per second. In the Doctor's opinion, single-digit frame-rate improvements are not worth spending upward of $200 for.

If It Ain't Broke...

I just had a new PC built with an Asus Sabertooth Z77 motherboard. I noticed that the chipset drivers are about one year old. Newer drivers are available on both Asus's and Intel's websites. The system seems to be working just fine. Should I update the drivers to the latest available? I cannot seem to find any details about what the new drivers correct from the previous release.

As a person who has assembled computers but who is far from expert, I sure would appreciate some help in determining if I should follow the "if it ain't broke don't fix it" rule, or am I just not knowledgeable enough to know that the computer does need fixing?

—Dick Patyrak

THE DOCTOR RESPONDS: "If it ain't broke, don't fix it" is the advice we normally give with regard to BIOS updates, not drivers, since a badly flashed BIOS can brick your motherboard. For drivers, we recommend installing the latest stable versions available from the manufacturer's website; chipset driver updates often include performance and stability updates.

Regarding BIOS updates, though, our policy may have to change soon—we've seen lots of weirdness and instability corrected with a BIOS update, and they're slightly less worrisome to install these days. The Doc suspects vendors are still getting the hang of UEFI, and new versions often address stability and compatibility problems.

Nothing to See Here

I need to erase a few files on my hard drive so they are totally unrecoverable. Can you recommend software?

—Name Withheld

THE DOCTOR RESPONDS: First of all, the Doctor reminds you that if you're currently under investigation it is a crime to destroy evidence, so don't do it. Next, the Doctor points you to the tool Eraser (http://eraser.heidi.ie), which can overwrite files, folders, and whole drives with random data so their contents are totally unrecoverable. Use with caution.

Proprietary Power Connector?

I have a few parts lying around and I should be able to build an HTPC with little or no investment. The center of the machine would be a nice Asus Mini-ITX board (M2N61-AR). The power supply associated with that board has died and I would like to use a standard one. Unfortunately, as you may know, the connectors don't match up. The connector on the board is much smaller than that of the standard PSU.

I've looked everywhere (including under the kitchen table) but cannot find an adapter that would transition from a standard PSU to the board. Do you know if such a thing exists? I've even contacted StarTech, which specializes in those type of things and they don't have one. I still have the old defective PSU. Is my only solution to cut the connector from it and get

↘ submit your questions to: doctor@maximumpc.com


This Asus board, exclusive to some long-vanished HP mini-machine, has a proprietary power connector instead of the standard ATX 24-pin. Fortunately, adapters are available.

busy with the old soldering iron and shrink tubes?

—Serge Desaulniers

THE DOCTOR RESPONDS: At first, the Doc thought it was simply an older 20-pin connector, but upon closer examination, it is indeed some kind of unique 24-pin connector. According to HP's website, it's a 2x12 "mini power connector." This is why the Doc and all enthusiasts hate proprietary parts. They're not a problem at first, but years later when you try to repurpose something, you find it's useless.

Fortunately, it looks like there may be a solution. We found a mini 24-pin ATX cable adapter on Amazon for 74 cents plus $2.69 in shipping. The description says, "This cable adapter enables you to use a regular ATX or Micro ATX power supply with an HP computer with a proprietary mini 24-pin power socket on its motherboard. Perfect when the old HP system power supply stops working and you want to use a regular ATX or Micro ATX power supply as replacement" (http://amzn.to/15mZpwL).

That's no guarantee it'll work, but the Doctor doesn't think HP has multiple different proprietary power connectors—at least, he hopes not. By the way, that board looks unique to HP. HP says it'll take an Athlon 64, Athlon 64 X2, or Sempron up to 65 watts only, and only 2GB DDR2 DIMMs.

It's a Gremlin

I have a 2-year-old home-built X58 rig. Almost from the time my computer was put into service, there have been video anomalies. The major, persistent problem is that when coming out of sleep or hibernate, the screen flickers black, holds at black for 15–20 seconds, and then stabilizes.

Under Windows 7 64-bit, there was a recurrent error message: "Display driver stopped responding and has recovered. Display driver Nvidia Windows Kernel Mode Driver, Version xxx.xx stopped responding," with the version number changing to represent the driver in use. Under Windows 8 64-bit, the error message doesn't appear but the problem persists. There is no particular software that causes it. It can happen in a game or Outlook or on the desktop.

EVGA replaced the video card three times, reporting that the RMA'd units tested clean. The mainboard was also replaced twice. After the third board showed no change, I replaced the motherboard temporarily with an Asus X58 unit, which didn't flicker at all but stopped passing video to the monitor within three days (even with a different GPU and monitor). Except for the CPU, I have tried using other hardware (GPU, mainboard, power supply) to no positive effect. I ran whatever diagnostic software the vendors recommended. All showed no problems. Temperatures are safely within parameters, even on the cool side.

I've done clean installs of both Windows 7 and 8, tried plugging the computer directly into the wall to bypass my UPS; in short, I've gone as far as I can. I'm about ready to trash the system and build a new one, but that doesn't make sense until I know what's causing the problem in the first place—whether it's repairable or endemic to the system as it stands.

—Ira J. Black

THE DOCTOR RESPONDS: It's probably a Mogwai, because your issue is not an easy one to track down. You've already eliminated the obvious suspects: GPU and PSU. Others with similar problems have reported it to be related to motherboard, RAM, or even hard drive. Still others report the error you had to be an issue with letting the GPU auto-select the PhysX device (choose manually instead) and others say tweaking the Timeout Detection and Recovery registry value helps address the "Display driver stopped responding and has recovered" error. See http://bit.ly/Kjl1i3.

You've swapped every component except for the CPU and have not been able to eliminate the problem, and even performed a clean install, so it's unlikely something inside your box. The only advice the Doctor can offer, other than investigating the Timeout Detection and Recovery fix, is to try a different monitor and display cable. The Doc has seen troubles similar to yours—flickering, taking a long time to stabilize after sleep—caused by bad capacitors in the monitor.

SSD Slower than Rated Speeds

I installed an OCZ Vertex 4 512GB and I am getting slow read/write speeds—about 50 percent of the rated speeds. I have a Gigabyte GA-X58A-UD3R (rev. 2.0) mobo, an Intel Core i7-970 CPU, and 24GB of Kingston DDR3 1,600MHz. I am using a SATA 6Gb/s connection in AHCI mode. I also used IDE mode, with the same results. Can you tell me how to get the rated speeds?

—James Capolupo

THE DOCTOR RESPONDS: Good news and bad news, James. Bad news first: You can't. The X58 chipset hails from a time before Intel had its own native 6Gb/s SATA controllers, and the Marvell SE9128 chipset your board uses just isn't as fast as the native Intel chipset (which is what everyone bases their performance numbers on).

The good news is that it doesn't really matter. Your rig is plenty fast, and your SSD isn't going to be slowing you down anytime soon. The big boost an SSD provides is the quick random-access times—the fast sequential read/write speeds are a bonus. You're still seeing faster reads/writes than on any hard drive, and even most SSDs. Don't let the difference between the rated and actual speeds get you down.

BY THE MAXIMUM PC STAFF AND MARCO CHIAPPETTA

FIX IT!

WINDOWS WON'T BOOT. YOUR HARD DRIVE WON'T SPIN AND YOUR INTERNET IS SLOW. NO THIS AIN'T NO COUNTRY SONG, IT'S WHAT HAPPENS WHEN THINGS ON YOUR PC BREAK. WE TACKLE ***THE FIVE MOST PRESSING PROBLEMS IN EACH MAJOR COMPONENT CATEGORY!***

It's happened to us all. You get home from a long day at work and you want to blow off some steam with an hour of gaming or maybe browsing the web, but when you tap your mouse button or punch the power switch, the unthinkable happens. You're SOL.

Whether the system is red-lining, the OS is BSODing, or your Internet is crawling on all fours, this frustration is familiar to any person who drives a PC. You're faced with a problem that stops you dead in your tracks. If you're a salty self-tech, you run through your proverbial checklist of areas to look at. But not everyone is so experienced, and even old hands have holes in their troubleshooting repertoire. So, in the interest of providing the most useful advice to the greatest number of people, we've compiled a list of the top five problems that could impact each of your computer's major hardware or software subsystems and our best advice on how to fix them.


CORSAIR

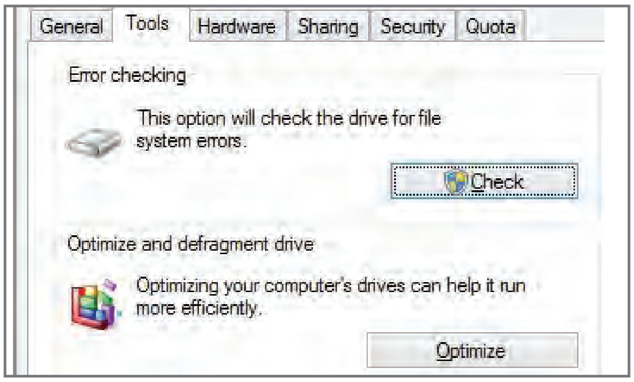
Storage

What to do when your hard disk is dying and your SSD is sputtering

PROBLEM: HARD DRIVE DISAPPEARS

SOLUTION: If it's a drive that was previously visible, the first step is to see if the drive shows up in the BIOS (check under Boot). If not, swap out the SATA and/or power cables. If the drive shows up, run CHKDSK on it by right-clicking the drive in My Computer, choosing Properties, then the Tools tab, and then "Check now" and "Automatically fix file systems errors." If the drive continues to give a ton of errors, and is behaving erratically but is visible in Windows, copy all data off it immediately if you can, or run Data Recovery on it STAT. If the drive is *not* visible in Windows, your options are limited to the Freezer Trick (an hour or so of extreme cold sometimes sets things straight) or expensive forensic-style data recovery.

If this is a brand-new drive that's not showing up, you need to initialize it first. Right-click My Computer and select Manage, then Disk Management and follow the prompts.



PROBLEM: OPTICAL DRIVE DISAPPEARS

SOLUTION: This classic conundrum involves either a missing drive or one that stops functioning suddenly. Put on your big-boy pants and type **regedit** in the Start menu search box, then navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Class\{4D36E965-E325-11CE-BFC1-08002BE10318}. If you see an entry named UpperFilters, delete it. If you see an entry named LowerFilters, delete it. Once you've done this, exit Regedit and reboot your system. In most scenarios, your optical drive will reappear and/or magically begin working again. Note that you may have to reinstall software that accesses the optical drive (e.g., burning software) to get back to 100 percent functionality.

PROBLEM: DRIVE NOT REPORTING FULL CAPACITY

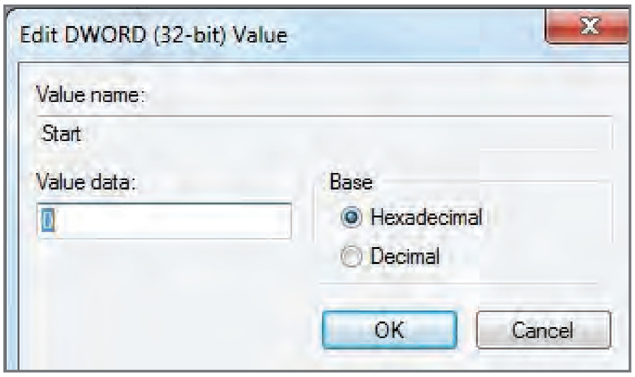
SOLUTION: This is usually an issue with 3TB or 4TB drives, as 2TB drives should have zero issues in Win7 (WinXP users might have to download a utility from the drive's manufacturer to allow for a drive with 4K sectors). Out of the box these 3/4TB drives are typically MBR disks, which limits a partition to 2TB (actually, 1.8TB or so) relegating the rest to a separate partition. If you want the full capacity in one partition, you need to convert the disk to GPT. To do this, type **cmd** at the Start search box; at the prompt type **diskpart**, then **list disk**, then **select disk X** (substituting X for your drive number), then **convert GPT**. Now go to Disk Management and create your massive single partition.

PROBLEM: SSD PERFORMANCE IS SLOW

SOLUTION: If you're using a hard drive and it feels slow, don't worry; that's how they are for the most part. If you're using an SSD and its slow, there is a problem. If you're not sure if it's slower than spec, download CrystalDiskMark and see what kind of sequential-read/write speeds you are getting. Second, make sure the drive is connected to the native SATA 6Gb/s ports on the motherboard. You can't rely on color, only your mobo manual, to tell. Third, go into the BIOS and make sure the SATA port for that drive is set to AHCI mode instead of IDE mode, as that will usually give you better performance.

PROBLEM: AHCI CAUSES BSOD

SOLUTION: Sometimes, people install Windows 7 without AHCI enabled, only to find out that enabling it after the install causes a BSOD. To fix this, you have to edit the registry. Press Windows + R key, type **regedit**, then navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\msahci. Then right-click the word Start on the right-side and click Modify. Change the value in the window to "0" and click OK. Exit Regedit, reboot the system, and change your SATA controller to AHCI; you will boot right into Windows.



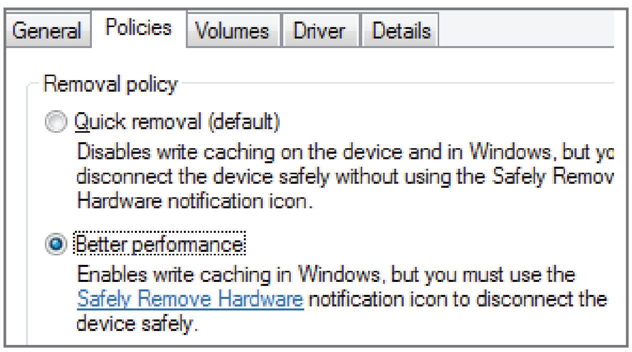
USB What to do when it won't plug nor play

PROBLEM: SOME USB PORTS DON'T WORK

SOLUTION: Nonfunctional USB ports could be caused by a few things. If the ports are front-mounted, make sure the internal cables are connected properly and that the requisite USB header is enabled in your system BIOS. If the ports are soldered on the motherboard (and enabled), open up Device Manager and see if any USB root controller or hubs are reporting a problem. If so, a driver update/reinstallation may resolve the issue. It's also possible that the physical connectors have been damaged (or a fuse has blown), in which case you'll have to re-solder some new ones onto the board. If the USB ports are associated with a third-party controller, be sure its drivers are installed, because Windows may not recognize the controller automatically.

PROBLEM: SLOW FILE TRANSFER OVER USB

SOLUTION: Windows Vista and 7 have some known USB performance issues, so the first thing to do is run Windows Update and make sure your OS is fully patched. We'd also advise installing the latest drivers for your motherboard's chipset and any discrete USB controllers. You could also try setting the USB drive to performance mode. Open Device Manager, right-click the USB drive, and choose Properties from the menu. In the resulting window, click the Policies tab and tick the option labeled "Better performance." Please note, this feature will enable write caching, so you'll have to use the Safely Remove Hardware option when disconnecting the drive to prevent any data loss.



PROBLEM: USB HUB DOESN'T WORK

SOLUTION: This problem is almost always caused by insufficient power being supplied to the hub. If the hub came with an AC adapter, make sure it's plugged in and working properly. And if you've got the hub plugged into a front-mounted USB port, try connecting it to a rear port that is soldered onto your mobo. Rear-mounted ports can usually provide more power (or more stable power), which can resolve some issues with finicky hubs.

PROBLEM: CHARGING PHONE OVER PC'S USB PORT TAKES FOREVER

SOLUTION: Standard USB 2.0 ports connected on a root hub have to share 500mA of current (USB 3.0 powers up to 900mA). If you've got a bunch of USB devices connected and the port your phone is plugged into is competing for limited power, it will take much longer than normal to charge. Try plugging the phone into a different port (preferably USB 3.0, if possible) or disconnecting other USB devices while charging.

It's worth noting that some motherboard manufacturers—such as Gigabyte—have begun incorporating high-powered USB ports that can deliver up to 2.7A of current onto their boards. If you want to rapidly charge devices while they're connected to your system, it may be worth checking out one of these boards.



PROBLEM: USB DEVICE IS NOT RECOGNIZED

SOLUTION: USB devices are usually as plug-and-play as you can get, but if a particular device isn't recognized properly, it may be incompatible with your USB controller or require drivers to be manually installed. Compatibility is very good with USB controllers native to modern chipsets, but we've seen some incompatibilities with some discrete USB 3.0 controllers that are yet to be resolved. Should you need to install drivers for the device, plug it into a USB port, then go to Device Manager, right-click the device, and choose Update Drive Software from the menu. Then, you can search the web for drivers automatically or point the wizard to any drivers downloaded from the device manufacturer's website.

Video Cards

Gee, pee-yew!

PROBLEM: GPU IS SLOW

SOLUTION: If your GPU is lagging, the first stop on the road to redemption is a driver update. Both Nvidia and AMD are engaged in a drivers arms race, with each company updating its drivers with an OCD-like frequency that's impressive. And always check to see if there's a new driver before you launch a brand-new game. You can find your driver version easily in both Catalyst Control Center under Information/Software, and in the Nvidia Control Panel. Overheating can also cause the GPU to throttle its clock speeds, so monitor your temps using the software provided by your GPU manufacturer.

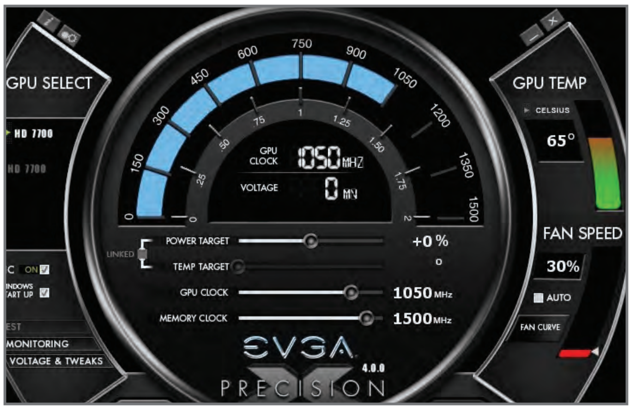
Driver Packaging Version	12.102.3-130416a-155949E-ATI
Catalyst Version	13.5
Provider	Advanced Micro Devices, Inc.
2D Driver Version	8.01.01.1295
2D Driver File Path	/REGISTRY/MACHINE/SYSTEM/Contro {4D36E968-E325-11CE-BFC1-08002BE
Direct3D Version	9.14.10.0968
OpenGL Version	6.14.10.12198

PROBLEM: MULTICARD SETUP NOT WORKING

SOLUTION: Dual-card setups can be problematic for a number of reasons, and getting them recognized by Windows is the first challenge. If CrossFireX/SLI isn't an option you see in the software, ignore your motherboard's color coding and move the second card to a different PCIe slot. Games are a different story, as the drivers have to include a profile for a certain game, benchmark, or application to allow both cards to function, so there is usually a bit of a wait after a game comes out for a compatible driver (EVGA uniquely offers temporary profiles for new games). Assuming dual-card mode is enabled in the drivers, and the game has been out awhile, your SLI/CrossFireX bridge could be faulty, but that is rare. You can try forcing dual-card mode via the Catalyst Control Center or Nvidia Control Panel, but success is hit-or-miss when doing this.

PROBLEM: SCREEN CORRUPTION AND ARTIFACTS

SOLUTION: Graphical corruption is usually due to one of two things: a video card that is either overheating or dying. First, check your temps using software like MSI Afterburner, EVGA Precision X, Asus GPU Tweak, GPU-Z, etc. Anything below 80 C is fine but a well-cooled card typically doesn't exceed 70 C. Second, take your GPU out of the case and give it a good cleaning with compressed air, and after you reinstall it, put some cool air on it by removing the case door for a bit, or manually turn up the fans to 100 percent using the above-mentioned software. To see if your card is dying, try running it in a friend's system to test; conversely, use his or her card in your system. Also, if you are overclocking, immediately go back to stock speeds.



PROBLEM: DISPLAY AND RESOLUTION ISSUES

SOLUTION: While not as common, you should never overlook a cable/connection issue as the cause of your problem. If you are running 2560x1600 resolution, you probably need a dual-link DVI cable (and therefore a dual-link DVI port on the video card, as well—some DVI ports are single-link, so check). DisplayPort also runs at 2560x1600, but VGA and single-link DVI do not. Also double-check the input source for your LCD, as that's a mistake that even non-rookies make. And double-check the cable you're using—swap it out if possible.

PROBLEM: SECOND DISPLAY NOT RECOGNIZED

SOLUTION: First, make sure you are running the latest drivers. Many systems that are running the default Windows drivers have issues with this. Second, make sure you have gone into the control panel of the drivers to enable the second display. Third, some DVI ports do not work if you are using a VGA-DVI adapter, so if there are two ports on your card, try them both. If you have everything set normally in the drivers, make sure your Windows settings are configured properly, and that you have multiple displays enabled.

CPU *It's* usually not the culprit

PROBLEM: CPU IS OVERHEATING

SOLUTION: Don't assume that high temps automatically warrant a new heatsink. The cooler is likely dust-clogged (try cleaning it), or the fan is dying (requiring a replacement). Or the heatsink has been poorly installed—remove it and remount it with new thermal paste. (Incidentally, degraded thermal paste alone can be the culprit). Other possible causes include the case fans—clean and check them. Or a newer, hotter GPU could have swamped your case's ability to stay cool. A BIOS update could also change the fan profiles from what you had set. Also keep this in mind: If your CPU is seemingly running "hot" but the machine isn't blue-screening or throttling clock speed, you probably don't have to sweat it.

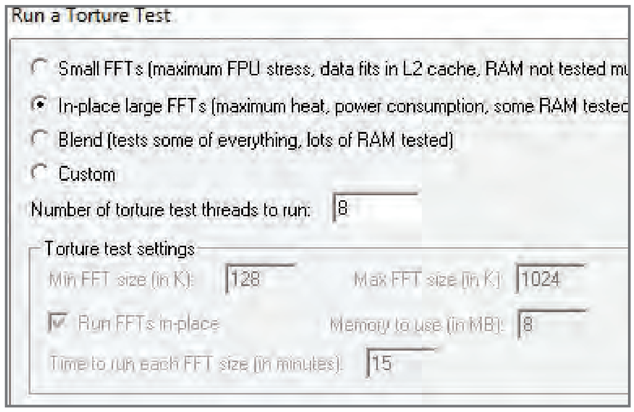
PROBLEM: CPU IS SLOW

SOLUTION: CPU performance issues typically come from misconfiguration in the BIOS or overheating. First, verify your chip's clock speed by running CPU-Z (www.cpuid.com) while running a CPU load in Cinebench 11.5 (www.maxon.net). If the clocks are correct (remember, chips don't Turbo under heavy loads on all cores), compare your Cinebench 11.5 scores with others on the Internet. The scores should be within a few percentage points of others. If the scores are close, the CPU is not "slow;" it's something else in your system. If the scores don't match, you may have a thermal issue. Check that your heatsink hasn't come loose, reapply thermal paste, and clean the heatsink and fans. A BIOS update could also be needed, as well.



PROBLEM: CPU IS UNSTABLE

SOLUTION: CPUs rarely "go bad." They typically work or don't work. Usually, it's everything around them that breaks. If you're overclocking, stop. Try to isolate CPU problems by running a CPU-intensive app such as Prime95. If it blue-screens, check thermal issues first (see "CPU Is Overheating"). Also check your RAM with Memtest86+ (www.memtest.org). Check your power supply connectors to the mobo and GPU. If the PSU is overheating and failing, it could cause crashes. Failing PSUs cause power sags, which can look like a bad CPU, too. If you have a known good PSU you can swap in, do so. Oddly enough, a failing GPU can resemble a CPU failure, so if you have a spare GPU or an integrated option, try switching to it and testing again.



PROBLEM: CPU IS ALWAYS UNDER A HEAVY LOAD

SOLUTION: Heavy CPU usage can be a sign of malware, so make sure your AV is updated and run a full system scan. Also consider running a secondary scan using Malwarebytes Free (www.malwarebytes.org) and any of the free web-based scanners such as those from Trend Micro, Bit Defender, or ESET. Also check to see that your own AV app isn't thrashing the system by doing a scan—check the running processes in Task Manager (Ctrl + Alt + Del, Start Task Manager, select Processes.) Click the CPU column to sort by usage and begin searching the Internet for each suspicious process name.

PROBLEM: CPU ONLY WORKS IN SINGLE-CHANNEL MODE

SOLUTION: First, make sure the RAM is OK by running Memtest86+ (www.memtest.org). If the RAM clears, check the slots for debris and swap out the DIMMs for known good RAM. If crashing persists when put into dual-channel mode, you likely bent a pin installing your CPU. We've seen this on LGA1366 and LGA1155 platforms several times. It can be fixed by taking a sharp knife and carefully straightening the pin in the socket (or on the CPU in AMD chips).

Network Why can't it just work?

PROBLEM: INTERNET CONNECTION DROPS

SOLUTION: The most likely culprit is your ISP, so prepare to wait on hold. Before you do, though, try some basic troubleshooting.

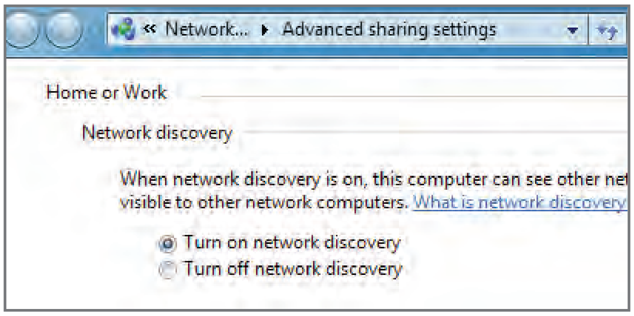
If your system(s) connects through a router, connect the system directly to your modem to see if the router has a problem, and also cycle the power on your broadband modem. But don't just quickly hit its power switch or reset button. Unplug it from power for a few seconds. Plug it back in and wait for the modem to resync with your ISP's network before testing the connection again. If you find yourself resetting your modem monthly or even weekly to resolve Internet connectivity issues, a call to your ISP is in order. There may be an issue that only a modem replacement or a service tech can fix.

PROBLEM: FILE DOWNLOADS TAKE FOREVER, PING TIMES SUCK

SOLUTION: Contrary to popular belief, there aren't any tweaks that will significantly speed up or improve Internet connection speeds. If your connection is usually fast, but slows during peak hours or only when connecting to certain sites, there may not be much you can do. You should certainly run a broadband test to see where your speeds actually are. ISPs usually have a guaranteed speed band that, if you're under, they will either fix or charge you less for. Also, power cycle your modem and router. Check your router's log to see if you have an unauthorized guest sapping speed. Streaming Internet cameras, or streaming Netflix to multiple devices will also sap performance.

PROBLEM: CAN'T ACCESS NEW SERVER/NAS/PC FROM OTHER SYSTEMS

SOLUTION: There are a number of things that could cause a new system/NAS to be inaccessible from other machines on a network. First, make sure the new system is definitely connected to the LAN properly and that its network controller is active. And also check that the system's configured with the correct IP address. If the server or NAS is on a different subnet, for example, it may appear to be connected to a network, but it won't be visible to your other systems. With a standalone NAS device, you'll have to log into its configuration menu, navigate to the LAN settings, and then enter the proper IP address (or set it to DHCP). To change an IP address on Windows 7 systems, you'll want to go to Network and Sharing Center, click the Local Area Connection, then click the Properties button, highlight Internet Protocol Version 4 (TCP/IPv4), and then click Properties again. You can change the system's IP address on the General tab.



It's also possible that your client PC has network discovery disabled or an overzealous firewall that won't let the system see other devices, so check that, too.

PROBLEM: SSID APPEARS BUT CAN'T CONNECT USING WI-FI

SOLUTION: Wi-Fi connectivity problems are almost always caused by interference or firmware and/or driver incompatibilities. The first thing to try is to simply reset your wireless router in case something's gone wonky that a reboot might fix. Pull your router's power cord, wait a few seconds, and then plug it back in. Once the router has fully booted, try to connect again.

If the issue persists, the wireless channel being used by your router may be congested. Download a utility like Insider (www.metageek.net) to your laptop, or Wi-Fi Analyzer to your smartphone, and scan the wireless networks in the area. If your router is using the same channel as many others within range, log into your router's configuration menu, navigate to the wireless network section, and change the channel to the one that's least used in the area.

If that doesn't help, try updating the router's firmware. Hit your router manufacturer's website and check for a firmware update. If one is available, download it, and then log into the router's configuration menu and apply the update (this process will vary from router to router—consult your manual). Once the firmware update is installed, configure the wireless network settings and try connecting again. Updating the drivers for your wireless network controller is worth a shot, too.

PROBLEM: INTERNET CONNECTION IS UNRELIABLE

SOLUTION: Unreliable or intermittent Internet connections are usually the result of a hardware or signal problem at some point between your PC and the web. Some of these problems you can fix, others may require a service call from your ISP.

The first thing to try is resetting your modem and router and swapping out the network cables between them. Kill the power to your modem and router, wait a few moments, and then power them back up. Also, be sure to use known good cables to connect the devices together. We can't count how many times a faulty cable has caused funky issues on a network. If the problem persists, give your ISP a call and have it run a diagnostic to check the signal strength and quality on your line. Should your ISP find a problem, odds are it can be fixed by a service technician.

Windows

What's made of 50 million lines of code and rarely breaks? Nothing

PROBLEM: WINDOWS IS FREEZING

SOLUTION: The biggest culprits here are usually malware (malicious software, whose favorite installation method is through browser exploits) or high temperatures in your case. With malware, there are no real standards for quality, so badly written ones can cause all kinds of performance issues. The stuff is also designed to be hard to find and hard to remove, so your antimalware software (Norton, McAfee, or Malwarebytes) might not remove it. In which case, you may need to reinstall Windows.

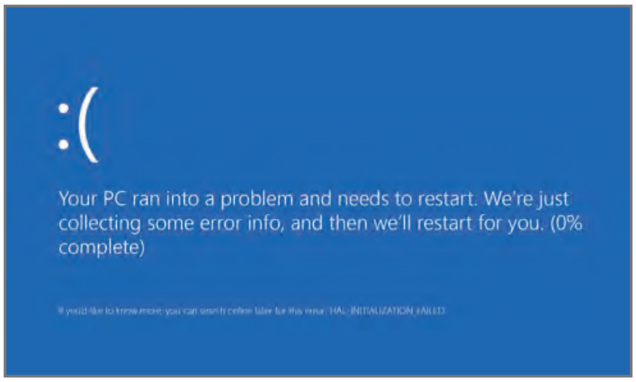
But before you nuke it from orbit, how dusty is your case? The stuff insulates whatever it's collected on and will clog fans over time. But a can of compressed air held upright and triggered in short bursts should take care of most of it.

Case vibration over time can also loosen cables and cause random loss of signal, so make sure those are all squared away (and not chewed up by gremlins).

Lastly, if you're overclocking your CPU or GPU, you may just need to tone that down a bit.

PROBLEM: BLUE SCREEN ERROR

SOLUTION: The usual villains are beta GPU drivers and overclocked CPUs (but feel free to Google specific error messages). GPU drivers see the most frequent changes in enthusiast PCs, and beta versions are sometimes shaky. You can uninstall these drivers in the Add or Remove Programs section of your Control Panel (Programs and Features in Windows 8), where the files are labeled according to your brand (usually Nvidia or AMD, sometimes Intel). Then reboot and install an older version of the driver obtained from the manufacturer's website, preferably the drivers labeled "WHQL" (for Windows Hardware Quality Labs), Microsoft's seal of approval. Didn't write down the BSOD info? Check out BlueScreenView (www.nirsoft.net).



PROBLEM: WINDOWS SLOWS DOWN

SOLUTION: The most common source of this problem is a program eating up your CPU power or RAM. Sometimes it's a memory leak, which means that a program isn't releasing RAM that it's no longer using, which can snowball over time to occupy all available memory. Restarting the program should fix the leak temporarily, but the long-term solution usually requires the program's creator to produce a new version. Other times, it can be a scheduled virus scan running in the background, or even a virus or other malware.

WHAT TO DO WHEN WINDOWS WON'T START

LET'S SAY YOU can get your computer to perform its POST (power-on self-test, which ends with a single, short beep from your motherboard if you have a speaker installed on it), but Windows itself won't load. Before you start sweating through Google searches, sometimes the problem is temporary and random; simply restarting your PC can make the problem go away.

If your PC tells you that a file called NTLDR.exe is missing, the problem may be more serious. Sometimes you can just create a new version of this file. For Windows 7, reboot and hit F8 just before Windows would start loading. This loads a troubleshooting menu, from which you select Repair Your Computer. This is mostly an automated process; you follow a few onscreen instructions and let Microsoft take the wheel. For Windows 8, you boot from its installation disc to access repair options, or you may have a Recovery Drive on a USB stick. To make your computer boot to those devices instead of Windows, consult your motherboard manual for the keyboard shortcut that can open your boot menu during the POST.

To check background programs, press Ctrl + Shift + Esc, which opens the Task Manager. You can click the labels at the top of each column to sort alphabetically, or by CPU or RAM usage. Save your documents or whatever else you were working on at the time. Then, if a program is eating up your resources and you don't recognize it, Google its name to determine its danger level. If it's not supposed to be there, you may need to manually run a virus scan to remove it. Or you may just be able to right-click the program in the Task Manager list and select End Process. In some cases, simply rebooting can make sluggishness issues disappear.

PROBLEM: WINDOWS UPDATE HANGS

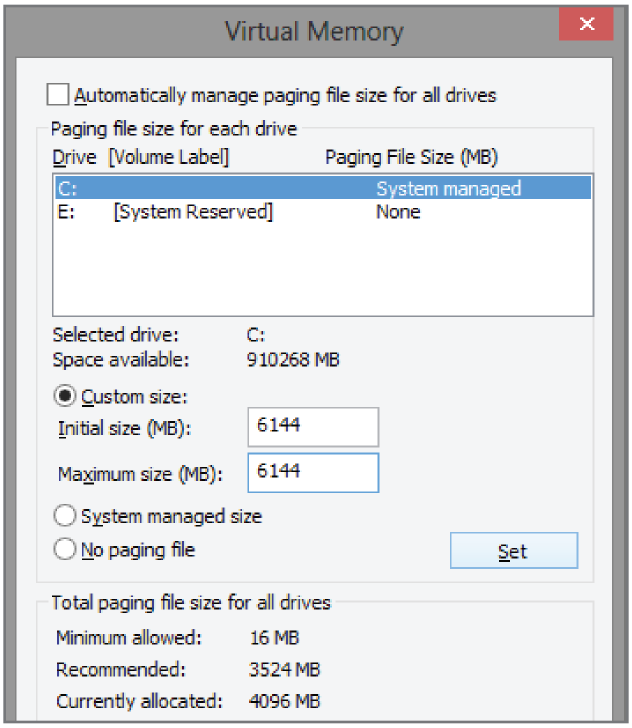
SOLUTION: First, is the time and date right on your PC? Microsoft has a "Fix It" file available on its support page that talks about this issue, Article ID 2700567. Just run that, and it may fix your issue. If not, you may have to use System Restore to reset Windows to before it hung on Windows Update. In Windows 8, you get there by restarting your PC, clicking the power icon on the login screen, holding down the Shift key, and selecting Restart. That will load a screen with some troubleshooting options. Select Troubleshoot, then Advanced Options. When you click System Restore, your PC will reboot in the Restore mode. Select your account, select Next on the next screen, choose your Windows drive, hit Next again, then wait for the restore process. You can hit Restart when that's done, then redo WIndows Update.

If your system isn't booting in Windows 7 and you need to restore, you need the installation disc and access to an admin account (home desktop users have this account type by default). Pop in the disc, reboot, and press any key when your PC prompts you to (shortly after the POST, but before your current Windows installation would start loading). Click through the CD's language, time, and input settings, select "repair your computer," and follow the onscreen instructions. The most recent Restore Point should work. After this process reboots your computer, try Windows Update again.

PROBLEM: LOW MEMORY

SOLUTION: If it's not a memory leak (see "Windows Slows Down) or other program hogging your RAM, you can try increasing your virtual memory, which is a cache that Windows stores on your hard drive. Right-click the Computer icon on your desktop and select Properties. (In Windows 8, switch to Desktop Mode to see the icon.) Click Advanced System Settings on the left. In the section labeled Performance, click the Settings button. Click the Advanced tab and click Change. Uncheck the box at the top and select Custom Size. A good rule of thumb is to set Initial Size and Maximum Size to 1.5 times your amount of RAM (listed on the Properties window you opened earlier). More than that can actually slow down your PC. Click Set and then click OK.

Editing high-def videos, high-res photos, or large audio files can eat up gigs of RAM, too. If that's something you do, adding more RAM is not a bad idea, assuming you have available slots on the motherboard and you can find sticks of the same type and speed.



Sometimes, you can still boot into Safe Mode to diagnose the problem. This is a stripped-down environment—only the minimum necessary services and drivers will load. For Windows 7, this is accessed via the F8 menu mentioned above. For Windows 8, you must also hold down the Shift key when pressing F8. It may take several tries to get your timing right, because your window is small. This will load Windows 8's recovery mode. Once there, click Troubleshoot to get a number of options, including loading a restore point, recovering from a backup drive image, accessing the command prompt to enter text commands, and altering Windows startup settings. It's not a bad idea to try the restore point or drive image options, if you created those recently. If not, then click the Startup Settings button, then click Safe Mode. Once this mode has loaded, you can try running a virus check or uninstalling recently installed programs or drivers.

It could also be a loose data cable on the storage device that contains your Windows installation, making it invisible to your PC. You'll want to shut down your rig, open the side panel, and do a spot check.

It's also possible that the drive Windows is installed on is dead. Storage devices usually do not give much warning of imminent failure. At most, you'll hear some crunchy sounds or clicking before they give up the ghost. If you install the drive in another computer and you still can't "see" it, it's probably a goner.

Sleep Even PCs can get insomnia

PROBLEM: WHEN PC GOES TO SLEEP, I CAN'T WAKE IT BACK UP

SOLUTION: Systems that don't wake up after going to sleep usually have a device connected or an internal component that misbehaves when the machine enters the sleep state. If you're lucky, the device is throwing an error before the system hangs and you can ascertain the culprit by checking out Event Viewer (click your Start button, type **event viewer** in the search field, and hit Enter. Then check the system log for critical errors). If your system isn't providing any clues, though, run Windows Update to ensure the OS is fully patched and also try updating your device drivers, especially for components like graphics cards, chipsets, and storage controllers.

It's also possible that a device connected via USB is the root cause of the problem, so try disconnecting any nonessential devices until you figure out which one's at fault.

PROBLEM: WAKING PC CAUSES CRASH

SOLUTION: A vital component or driver that doesn't reinitialize properly when the system is coming out of the sleep state is most likely the cause of the crash. More often than not, driver and/or firmware updates can resolve issues like this one. A flaky piece of hardware, like a bad stick of RAM, can also be the root cause, but software issues are much more likely, especially if the system is stable and behaves normally otherwise. Add-in storage controllers and older graphics cards are commonly the cause of sleep-related instability, so make sure you're using the latest drivers and firmware for both. Installing the latest BIOS on your motherboard and using the latest drivers for your chipset are also recommended.

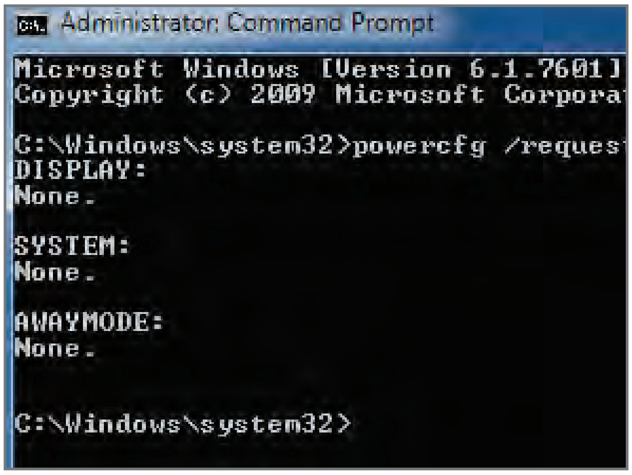
PROBLEM: PC CRASHES WHEN IT GOES TO SLEEP

SOLUTION: The most likely solutions to this problem are virtually identical to the previous question, so follow our recommendations above. Also keep in mind that if the crash results in a memory dump and an event being written in the system log, checking out the details in Event Viewer can help quickly sniff out the offender. Googling the actual error codes or using a utility like BlueScreenView can also come in handy to help pinpoint the cause.

PROBLEM: SYSTEM KEEPS WAKING FROM SLEEP

SOLUTION: A few things can cause a system to constantly wake from sleep. One of the more common problems is a pesky malware infestation that triggers some sort of scheduled task, so run a scan on your system to be sure it's not infected.

A component in the system can also be the culprit. To find out exactly what caused your system to wake up, open a command prompt with elevated privileges (type **cmd** in the Start search, right-click and Run as Administrator); at the prompt type: **powercfg /lastwake** and the utility will list the device or service that last woke the PC. If it turns out it was a nonessential service, you can simply disable it. If a system component was the cause, open Device Manager, find the component, right-click it, and choose Properties from the menu. In the window that pops up, click the Power Management tab and uncheck the field labeled "Allow this device to wake the computer."



PROBLEM: PC WON'T GO TO SLEEP

SOLUTION: If your PC won't go to sleep, check that you've got it configured to go to sleep in the first place. Click your Start button, type **power options** in the search field, and hit Enter. Then click the "Change plan settings" link for the plan you have selected and make sure there is a value in the "Put the computer to sleep" field.

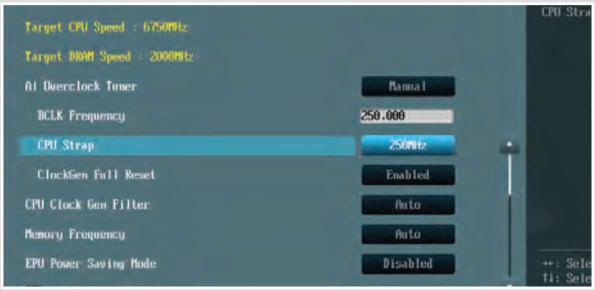
If you're certain the system is configured properly for sleep, but it still won't power down, open a command prompt with elevated privileges and at the prompt type **powercfg /requests** and hit Enter to see a list of items that are preventing the system from going to sleep. Once you've found the culprit, disable it (if it's nonessential) or change its Power Management settings (see above) and your PC should go to sleep.

THE 10 COMMANDMENTS OF TROUBLESHOOTING

Important life lessons for dealing with a broken PC

1. PAUSE YOUR OVERCLOCK

Overclocking is indeed a wonderful way to get free performance, but when you are troubleshooting a mysterious issue, put a pause on your extracurricular clock-pushing.



2. DO NOT USE MICROSOFT AS A BOOGEY MAN

It's easy to point fingers at Microsoft for everything from the JFK assassination to, well, the Modern UI, but usually OS problems can be traced to buggy applications and drivers rather than the OS itself. Don't get us wrong, there are still many, many bugs in Windows' probably more than 50 million lines of code, but blaming Microsoft while throwing your hands in the air with defeat, rather than really investigating the problem, is a cop-out.

3. UNPLUG IT

It's common to begin working on your system with the PSU still plugged in or switched on. People forget that when the PSU is hot, power is still running through the RAM and PCIe slots. It's very little power but there's still a small risk of damaging components when removing parts from the motherboard, so switch off your PSU before you tinker.

4. BLAME THE BUILDER

Wires don't unplug themselves and RAM doesn't back out of a slot. In such cases, it's usually a sign that the original system builder made a boo-boo. If you're a DIYer, like us, you know who gets to eat the turd sandwich.

5. ALWAYS BE GROUNDED

Granted, donning a grounding strap or ESD smock just to pull out a stick of RAM is a tad overkill, but you should at least touch a large metal object such as file cabinet to discharge any built-up static before touching any sensitive electronics.

6. AT THE FIRST HINT OF TROUBLE, BACK UP

When your drive makes one mysterious click or when even a single NAS fan fails, do a complete backup rather than waiting and potentially feeling remorse that you didn't act sooner.

7. WHEN IN DOUBT, REBOOT

Rebooting will fix more things than you can imagine, especially for those folks who put their PC to sleep rather than shutting down.

8. RETRACE YOUR STEPS

If something just broke, it's usually the last thing that *you* did. So, if you installed a new AV program, a new stick of RAM, or mucked with the registry to improve performance, put the truck in reverse and beep your way back.

9. CHOOSE THE RIGHT TIME FOR MAINTENANCE

Your term paper is due tomorrow morning, so it probably isn't a good time to flash your BIOS and firmware and resize your disk partitions. Rather than turn a standard repair job into a critical emergency, choose the right time for maintenance.



10. MOST HARDWARE PROBLEMS CAN'T BE FIXED

The sad thing about integrated circuits is that 80 percent of hardware issues can't be fixed by you. Sure, you can replace a burst capacitor or bend back a socket pin, but a fried CPU, bad stick of RAM, or disabled SSD can't be fixed no matter how many hours you burn on it. Sometimes, it's better to just know when to fold 'em.

PANELS ON PARADE

INEXPENSIVE IPS SCREENS, 120Hz REFRESH TECHNOLOGY, ULTRA-HIGH-RES PANELS—YOU CAN HAVE ALL THAT AND MORE FROM THE LATEST PC MONITORS **BY JEREMY LAIRD**

Affordable PC monitors are miles better today than just a few years ago. As painful as it is to admit, we've mostly got Apple to thank for at least part of that. Yes, really.

In June 2010, Apple rolled out the iPhone 4 and made a huge noise about the new handset's IPS screen. Was it the first smartphone with an IPS screen? Google it if you care, because that detail doesn't matter.

The two things that do matter are that, first, IPS is a premium LCD panel technology that offers improved image quality over the more commonly used TN tech. Second, Apple has massive traction with the mouth-breathing masses and dominates mindshare when it comes to consumer technology.

Suddenly, an IPS screen was something your average Joe wasn't just aware of, but understood to be a good thing. After all, if the iPhone 4 had IPS, you want all your screens to be IPS. This effect can't be underestimated.

Just a few years ago, a key monitor manufacturer we spoke with said it wanted to put better panels in its displays, but that customers weren't willing to pay for them.

Now they are, and it's partly thanks to Apple. Of course, that doesn't mean PC monitors have reached a state of perfection. We'd like to see more PVA panels (another type of premium LCD tech) on the market, and more choice in terms of resolution, too.

It's not always easy to pick the good from the bad. Specs can be misleading and gimmicks, unfortunately, still abound. But we'll come to all that momentarily. In the meantime, suffice it to say you can get more for your money than ever before. Shop on, people.


BenQ

ASUS

ViewSonic


SAMSUNG


SPEAKING OF SPECS

A few key features make all the difference in a monitor

HERE WE GO AGAIN, with another roundup of our favorite screens, and some things haven't changed since our last outing. That includes the general value proposition of a good PC monitor. It's the best long-term investment you can make.

That's because a good monitor today will still be a good one for you two years down the road. While a graphics card with a few seasons under its belt can leave you gasping for a few extra frames when you fire up the latest shader-soaked gaming spectacular, your monitor isn't going to affect your frame rates, or any other performance variables, for that matter.

For starters, screen technology develops at a slightly more leisurely pace. More than that, it's not performance-critical in the same way that a graphics card, CPU, or solid-state drive is to a system. But it most certainly is critical in terms of how much enjoyment you will get out of your PC. It's quite simply and literally your window into the computing experience, so why skimp on it?

Often, it doesn't matter whether you're rocking a worn-out Celeron CPU or some crazy new six-core monstrosity. That web page will look just the same. Not so for a monitor. Whatever you're looking at, the monitor is making a difference.

Panel Tech

With that little pep talk out of the way, let's consider the current state of play in the PC monitor market. The biggest trend right now is the aforementioned renaissance in panel technology.

IPS (or In-Plane Switching) is nothing new, of course, but for a while it looked like it would disappear for good from PC screens. Apple's big push with IPS in the iPhone and iPad changed all that. Now IPS is de rigueur for phones and tablets.

Affordable IPS PC monitors then followed around a year ago, and prices have been slowly edging down ever since. We're now at the point where it's possible to snag a 22-inch IPS panel for under $150. It's insane.

Some manufacturers offer alternative VA (Vertical Alignment) panel technology for similar prices. It's worth bearing in mind that merely being IPS or VA is not a guarantee of great image quality. For starters, all these cheap IPS screens are 6-bit-per-channel in terms of color fidelity, so they're not as accurate as premium 8-bit-per-channel IPS screens of old.



Mobile Apple gadgets like the iPhone 4 have popularized IPS panel technology.

Making Resolutions

Panel type aside, what else should you worry about? When it comes to resolution, unfortunately, there's not always a lot of choice. Nearly all panels in the 22- to 24-inch space are 1080p. That means 1920x1080 pixels.

That's hardly a pittance, but when you consider that the latest high-end smartphones can match that and some tablets now outstrip it with 2560x1600 grids, it's hard to avoid the conclusion that PC monitors are lagging behind a little. With any luck, it'll be IPS all over again, with high-resolution smartphones and tablets encouraging similar technology adoption in PC monitors.

That said, there is a clear downside to higher resolutions in gaming PCs: The more pixels you're pumping, the greater the load on your graphics card. Moreover, arguably, there's not a huge benefit in terms of image quality in games in going beyond 1080p with a 22-, 23-, or 24-inch monitor. If you do want to have more pixels though, there are options.

Dell, for instance, still does the 24-inch Ultrasharp U2412M with an old-school 1920x1200 grid. The extra 120 vertical pixels give you that little bit of additional elbow room for web browsing. The U2412M can be had from Amazon, among other etailers, for just over $300.

The next step up is a 27-inch panel with a 2560x1440 grid. Prices start around the $500 mark from online retailers, and currently, models are all premium panel technology of some kind—you don't need to worry about choosing between IPS and TN. Then there's the old-school 30-inch option with a 2560x1600 grid. Prices for those typically start at $1,000.

Look East

It's at this stage that the subject of Korean-sourced 27-inch IPS monitors pops up. As we go to press, there are suppliers on eBay that will sell you a 2560x1440 27-inch panel for as little as $350, including shipping costs.

The drill here is obviously caveat emptor. You're getting a screen with a very cheap chassis and stand, and the panels are those rejected by the major manufacturers. But lots of people have had great success buying these bargain panels, and the prices make them very tempting indeed.

A compromise is to go for a 27-inch IPS or VA panel with a conventional 1080p pixel grid. It's a pretty nice overall solution for work and games, and one you can have with the peace of mind of a supplier and brand name you're familiar with.

It's also worth noting that the latest TN panels are better than ever in terms of color and contrast and even viewing angles. There's no longer any shame in TN.

Another trend that overlaps with cheap Korean panels is higher refresh rates—120Hz or even 144Hz. Panels with high-refresh-rate support (standard LCD screens refresh at 60Hz) began popping up when Nvidia rolled out its 3D Vision technology.

We've never been big fans of the 3D tech itself, but the higher refresh required for an active-shutter 3D solution like 3D Vision comes with its own benefits. (At least in the eyes of some, as our "Refresh Rate Challenge" in the May issue demonstrated.) In games, it makes for much more responsive action. Even just juggling windows and scrolling web pages on the desktop can seem smoother. The only snag is that you currently can't have your 120Hz/144Hz cake and eat your IPS panel—it's one or the other, with the possible exception, again, of those Korean 27-inch panels, some of which claim to have been modded to support a high refresh rate. This is something we've never tested and we'd recommend proceeding with caution.



The Dell 3007WFP is seven years old, but its 2560x1600 panel is still a wonderful thing.

As for other technologies, like dynamic contrast and fancy color modes, we've yet to see much benefit. There's simply no substitute for a good panel.

THE NEXT BIG THING IN MONITORS



ViewSonic's getting into 4K with the VP3280-LED. But it will cost as much as a car.

THIS YEAR'S CES SHOW in Las Vegas gave us a whiff of what's to come in screen technology.

Resolutions have been stagnant for a while, so it's interesting to note Sharp and ViewSonic showing off some new 4K 32-inch monitors. The 4K standard has a few variations, but for PC monitors, you're usually talking 3840x2160 pixels—a big jump up from 2560x1600, which is where mainstream PC monitors currently top out.

These displays require a pair of dual-link DVI or DisplayPort connections and, of course, one hell of a graphics card to pump a grand total of more than 8 millions pixels, or double the number achieved by 2560x1600 efforts.

Not that the new Sharp and ViewSonic screens are exactly affordable, with prices starting at over $4,500, but with smartphones and tablets increasingly pushing the boundaries in terms of pixel densities, we reckon it's only a matter of time before PC monitors get in on the fun.

More realistic is the quest for more high-refresh-rate monitor options this year. Refresh rates of 120Hz and 144Hz are commonly available for 22- to 24-inch TN monitors. What you can't get from the big brands are 27-inch, IPS, or both with refresh rates this high. Here's hoping that changes in 2013.

But what about OLED technology in PC screens? Unfortunately, it remains tantalizingly out of reach. Several companies are showing off big-ticket OLED TVs, but OLED monitors remain relegated to professional applications, with pricing to match.

The upside is that you can buy a conventional LCD monitor today, safe in the knowledge that it won't be made to look old-hat suddenly next week when all your friends buy shiny new OLED panels.

ASUS VS278Q

So-so specs and performance

WHAT IF YOU woke up one day to find you'd been transmogrified, Kafka-style, into a PC monitor? How to go about leading a fulfilling life?

If you boil it right down, you've really only got two options available. Either you wow the world with outstanding features, preferably something that's desirable but rare—like, say, combining IPS and 120Hz/144Hz technology. Or you could take a stab at being very good at doing something more mainstream.

The Asus VS278Q definitely falls into the latter category of being a conventional-but-quality-product. It's a 27-inch model with a 1920x1080 pixel grid. It's a TN panel. And it doesn't exactly leap off the specification sheet. Whether it's the 170-degree horizontal/160-degree vertical claimed viewing angles or the 300cd/m2 brightness, we have seen its like before.

We readily admit that a pixel response rating of 1ms qualifies the Asus VS278Q as cutting-edge, but the bottom line is that your new life as an Asus screen will be all about execution. Unfortunately, you could do better. The real-world viewing angles are mediocre, for instance. We found that there was noticeable color compression in evidence and, worse, some nasty pixel dithering when rendering certain colors. Yuck.

Then there's the limited adjustment and physical flimsiness of the tilt-only stand and the lack of DVI connectivity, though you do get a pair of HDMI ports and DisplayPort. It's a pity, because the color saturation and contrast are strong for a TN panel. And as you would expect from a 1ms panel, the pixels can really shift. Maybe waking up as an insect is the better bet overall.

SPECIFICATIONS

Size	27 inches
Panel Type	TN
Backlight	LED
Native Resolution	1920x1080
Max Refresh	60Hz
Pixel Response	1ms
Inputs	2x HDMI, DisplayPort, VGA



The VS278Q's 1ms response time is offset by a mediocre picture and limited adjustability.

VERDICT 7

Asus VS278Q

$310 (street), www.asus.com

BENQ GW2750HM

Give it time to grow on you

THANKS TO APPLE, the unwashed masses have finally woken to the delights of IPS screen technology. The downside of this development is, of course, that Joe 12-pack's salivating worship of all things Apple doesn't leave room for a more nuanced view.

In that context, what's the point of offering an alternative premium panel technology? There are good technical reasons for doing so, and that's exactly the tack BenQ is taking with the GW2750HM. It's got a Vertical Alignment, or VA, type panel.

Believe it or not, ladies and gentlemen, VA technology does have some advantages over IPS. The most obvious advantage is contrast. The best VA panels sport unbeatable contrast and black levels. They're better than TN in most regards and close to IPS for color accuracy.

Factor in a remarkably low list price for a premium-panelled 27-inch model—albeit a mere 1080p full-HD model rather than a 2560x1440 pixel monster—and the BenQ becomes a very interesting overall package.

Fire up the monitor and you might wonder what all the fuss is about. The colors don't exactly pop, the LED backlight doesn't exactly melt your retinas, and the pixel response isn't TN-caliber. Give the screen a little longer trial, however, and you will begin to pick out those deeper blacks and the superior contrast. You'll also come to appreciate the wonderfully subtle and detailed colors.

Such nuances, not to mention the low price, make it easier for us to forgive the BenQ's tilt-only stand and its less-than-sturdy construction. We likey.

SPECIFICATIONS

Size	27 inches
Panel Type	VA
Backlight	LED
Native Resolution	1920x1080
Max Refresh	60Hz
Pixel Response	4ms
Inputs	DVI, HDMI, VGA



The GW2750HM stands out by offering a VA panel, which rivals IPS in overall quality.

VERDICT 9

BenQ GW2750HM

$260 (street), www.benq.com

BENQ XL2420TX

A fine 3D solution, if that's what you're after

ADMITTEDLY, we have mixed feelings about current 3D technology, but the 24-inch, 1080p XL2420TX shows current 3D at its best. In no small part that's due to its full support of Nvidia's 3D Vision 2 technology, including LightBoost. The latter feature significantly boosts a 3D screen's visual punch and vibrancy, which has traditionally been a weak point in monitors that rely upon polarized active-shutter glasses.

But the basic image quality is also exceptional for a TN panel. Rich and vivid colors, strong contrast, and little to no evidence of compression—it's not often you can say that of a TN panel. OK, the vertical viewing angles are never going to scare an IPS screen, but this display is very competitive by most other metrics.

What's more, the OSD controls are a joy to use and the 3D support means 120Hz is on offer. And so we come to the XL2420TX's $470 street price. That's about $100 more than BenQ's XL2420T, which is the same in every respect save the built-in IR emitter and bundled 3D shutter glasses. That amounts to about $130 worth of peripherals bought separately, so the value proposition is OK. The problem, however, is that you can't use it with another monitor, so you're locking yourself in. We'd rather opt for the non-X model and buy our own 3D setup, thanks.

SPECIFICATIONS

Size	24 inches
Panel Type	TN
Backlight	LED
Native Resolution	1920x1080
Max Refresh	120Hz
Pixel Response	2ms
Inputs	DVI, 2x HDMI, VGA



The XL2420TX comes with a built-in IR emitter and a pair of 3D Vision 2 glasses.

VERDICT 8

BenQ XL2420TX

$470 (street), www.benq.com

SAMSUNG SERIES 9 S27B970D

You must pay to play

BACK IN 2005 when the first 30-inch panels with 2560x1600-pixel grids popped up, we thought it was only a matter of time before big screens with resolutions to match trickled down to the mainstream audiences.

Well, here we are nearly eight years later, and this 27-inch Samsung screen with slightly fewer pixels (2560x1440) is still a $1,000 item. It's really quite disappointing, but let's put pricing to one side for a moment. Just how good is the Samsung Series 9 monitor?

One thing's for sure: It's a gorgeous panel. Samsung pitches it as PLS (Plane-to-Line Switching) technology, but it's basically a derivation of IPS. Except it might actually be better. Samsung's version offers all the usual IPS refinements, such as epic viewing angles and fantastic colors, but you get some extras, too. PLS has deeper, inkier blacks than we're used to from IPS panels. As good as the best PVA screens? Not quite. But still excellent. Samsung also uses a much smoother, less sparkly antiglare coating than most conventional IPS panels.

The chassis is a nice piece of work, too, with height and tilt adjustability and an overall luxury vibe. Samsung has also thrown in a Mobile High-Definition Link interface, which will enable you to hook up Android phones.

It's all good, then? Sadly not. For reasons we cannot fathom, Samsung has chucked all this behind a so-called Crystal Clear Glass panel. We suppose they've seen Apple do it on iMacs and thought it was a good idea. But it's not. And it comes close to ruining this lovely monitor.

SPECIFICATIONS

Size	27 inches
Panel Type	PLS
Backlight	LED
Native Resolution	2560x1440
Max Refresh	60Hz
Pixel Response	5ms
Inputs	DVI, HDMI, VGA



What a gorgeous screen—too bad there's a stupid glass cover over the display.

VERDICT 8

Samsung Series 9 S27B970D

$1,000 (street), www.samsung.com

VIEWSONIC VX2370SMH-LED

IPS panel wows us on all fronts

JUST 18 MONTHS AGO, monitors like this wouldn't have seemed possible. Not only is its 23-inch expanse endowed with a full-HD pixel grid (that development has actually been run-of-the-mill for a few years), but it's also got an LED backlight.

And here's the really sweet bit: It's an IPS panel, to boot. Oh, and it's not just any old IPS technology, either. ViewSonic has upgraded it from a 6-bit panel, as with the old VX2336s-LED, to full 8-bit. OK, some pro panels are now 10-bit. But you get all of this for a mere $170, which is redonk.

That's even before you take into account the fact that it's a sexy-looking little number that also has a stylish chassis.

SPECIFICATIONS

Size	23 inches
Panel Type	IPS
Backlight	LED
Native Resolution	1920x1080
Max Refresh	60Hz
Pixel Response	7ms
Inputs	DVI, HDMI, VGA

So, along with all those features it's got a distinctive and pleasingly modern and minimalist look—what more could you ask for?

As for the display's image quality, it's as nice as you would hope from an 8-bit IPS panel, for the most part. OK, there's a little color banding, which is odd, to say the least, for 8-bit tech. But unless you're a graphics designer or a publishing professional, it's a relatively minor flaw that will go unnoticed by most people. Surely there must be other chinks in the armor?

Actually, yes. The OSD controls give the impression that they have been intentionally positioned to be infuriatingly out of reach. And the base is tilt-only and not VESA-compatible. But with the combination of superb screen technology and incredible price, it's an excellent panel.



We'd be even more enamored of this high-quality-but-affordable screen if the stand offered more adjustments than just tilt.

VERDICT 9

ViewSonic VX2370SMH-LED

$170 (street), www.viewsonic.com

VIEWSONIC VX2460H-LED

An extra inch at the cost of quality

WHAT'S AN INCH WORTH to you? That's essentially what it all comes down to for the ViewSonic VX2460H-LED. For this is a 24-inch monitor, making it precisely one inch bigger than, yes, a 23-inch monitor.

A blinding glimpse of the very obvious, you cry? Well, we're trying to make a point, which goes something like this: For less than the cost of this 24-incher you can have any number of 23-inch screens, including the aforementioned ViewSonic VX2370SMH-LED. And that's got a lovely IPS panel. While this has but a TN screen.

And thus the VX2460H-LED's predicament begins to unfold. Making matters worse, there's no DVI port, just HDMI and VGA ports.

SPECIFICATIONS

Size	24 inches
Panel Type	TN
Backlight	LED
Native Resolution	1920x1080
Max Refresh	60Hz
Pixel Response	2ms
Inputs	HDMI, VGA

That said, this LCD does have a few features going for it. The ultra-slim chassis has quite a natty design, for starters. But the real value of that is debatable. Unlike a super-skinny HDTV, you're not really going to mount this thing on a wall—unless you live in a cupboard.

As TN screens go, we'll concede the image quality is alright, too. Vibrant colors, decent contrast, so-so viewing angles, yada, yada: It's a modern TN panel all around. You know the drill. Overall, then, it comes down to that aforementioned inch—24 is one more than 23. And that makes this screen a bit bigger. Is it enough to trade IPS in favour of TN? Not so much.



It's hard to make a serious case for the VX2460H-LED when you can get ViewSonic's 23-inch IPS panel for less money.

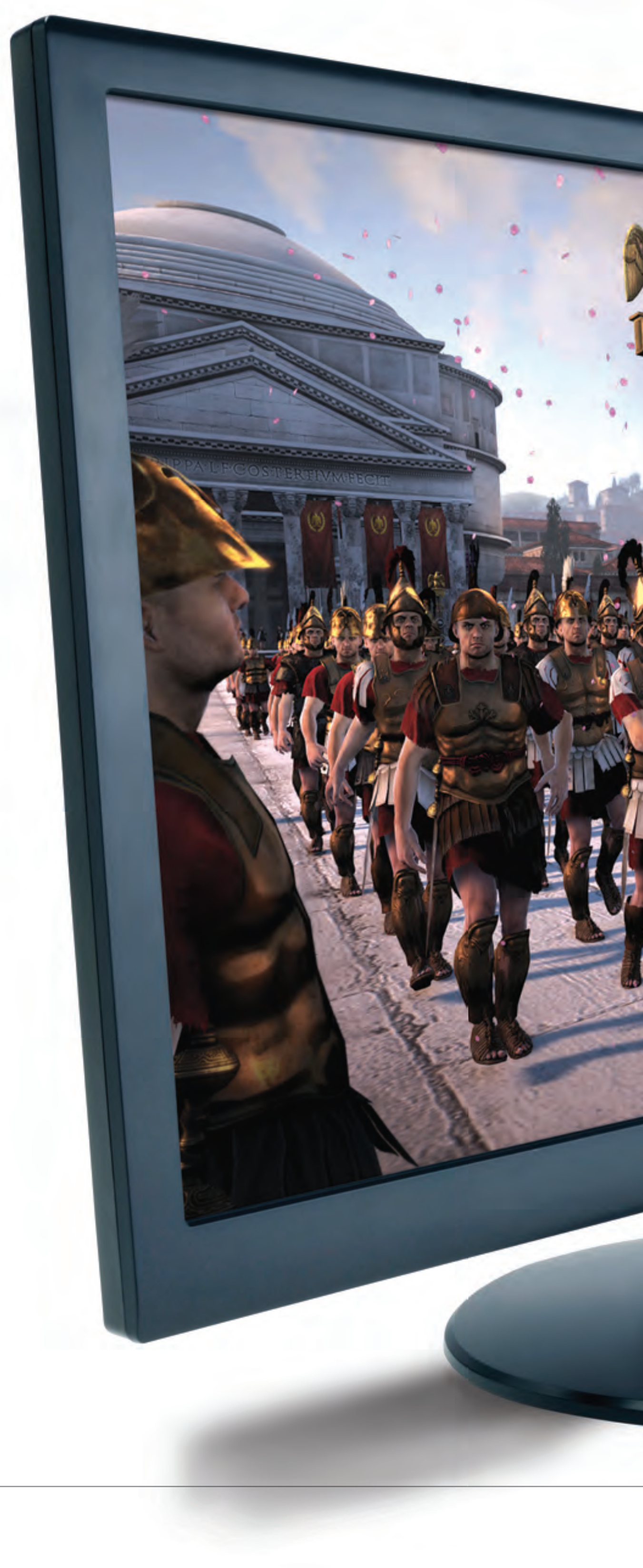
VERDICT 7

ViewSonic VX2460H-LED

$200, www.viewsonic.com

PICKING THE

What to look out for when buying a screen



ARE PC MONITORS merely badge-engineered commodity items? It's certainly true that only a small handful of manufacturers actually make the LCD panels that go into them, which means there are recognizable levels of technological overlap. Take, for instance, the fact that many of the current crop of affordable IPS screens share panels.

But occasionally, a monitor manufacturer picks up a new panel before the competition. For example, ViewSonic seems to have broken from the fray by upgrading its IPS 23-incher from 6-bit-per-channel color to 8-bit. What's more, image-processing electronics can make a difference, especially when it comes to color dithering. So, it's eyeballs out to pore over the details.

We use the trusty Lagom LCD suite of test images and metrics to provide a common baseline. Handily, you can too, by heading over to www.lagom.nl. There are test images to help you assess everything from viewing angles to pixel response and color fidelity.

If that's the more objective part of the equation, there's no substitute for some subjective immersion. That'll be games, movies, and just flicking about on the desktop. Sometimes a screen that doesn't perform all that well in the objectives is still a very nice panel in practice.

Panel Type

This is the biggy, the heart of your display, and you basically have three choices: TN, IPS, and VA. TN is the cheapest and quickest in terms of pixel response. It's also the best for pure gaming.

For everyone else, IPS is the affordable option—and offers superior viewing angles and colors to TN. Pixel response isn't that far behind, either, making it a tough sell for the TN panels.

VA is the odd man out. It's used fairly infrequently now, but offers better blacks and contrast than both TN and IPS, along with color fidelity and viewing angles that sit somewhere in between the two.

Backlight Technology

We've been waiting eons for a dramatic change in panel technology, and yet it never seems to materialize. In the meantime, at least the backlight technology tree has been given a good shake. In the last few years, CCFL, or cold-cathode fluorescent, backlights have been almost entirely replaced by LED backlights. Just about every PC monitor is now LED.

But not all LEDs are created equal. For starters, there's the choice between white and RGB (or red-green-blue) LED backlights. The latter produces purer, cleaner light and allows a broader color space. But RGB LEDs are expensive and relatively rarely used. None of the screens tested here, for example, are backlit by RGB LEDs.

PERFECT PANEL



Image Processing

Manufacturers know that big numbers make for impressive reading—numbers like 10,000:1 or even 1,000,000:1 when it comes to contrast ratios, for instance. Little numbers work, too, like 1ms for pixel response.

These features and more are made possible by image-processing technology. Sharp contrast is achieved via backlight modulation, dimming the lights when dark images and video are displayed. Fast pixel response comes courtesy of overdrive algorithms that pump pixels with exaggerated voltages.

The thing is, none of these features are a substitute for a good panel. Strong contrast with a static backlight is always better than the dynamic sort. And overdriving pixels can lead to nasty side effects, like inverse ghosting.

Refresh Rate

Forget stereoscopic 3D, the next big thing in PC monitors is high refresh rates. At least we think it ought to be. As it happens, the faster 120Hz and 144Hz refresh standard (most LCD monitors are 60Hz) only came about because it was necessary for active-shutter 3D technology.

But never mind, because it's here now and it's lovely. Until you've seen the added smoothness, felt the increased response, it's hard to really appreciate the benefits of a higher refresh rate.

Unfortunately, however, 120Hz/144Hz technology is currently limited to screens with TN panels. We're still waiting for the ultimate combination of this tech with IPS or VA.

Video Inputs

Now that we've all gone digital, surely video inputs don't matter? Up to a point, that's true. Indeed, the video signal used by DVI and HDMI is essentially shared, which is why those little DVI-to-HDMI adaptors are possible.

But there are a few things worth factoring in. Screens with resolutions beyond 1920x1200 or with 120Hz-plus refresh speed need dual-link DVI or an HDMI 1.4 port on your graphics card to pump all those pixels.

And what about DisplayPort? It offers several theoretical advantages, including the ability to daisy-chain multiple monitors in a serial setup. In reality, that's a fairly uncommon usage scenario.



THE SOUND AND THE FURY

SIX HIGH-PERFORMANCE GAMING HEADSETS VIE FOR A PLACE ON YOUR EARS **BY ALEX CASTLE**

Bullets hiss and whine overhead. Your commander barks orders in your ear, but you're pinned down, trapped in a wrecked construction site. The corrugated steel wall to your left pings as a smoke grenade bounces off and rolls into a nearby ravine. Overhead, a fighter jet streaks by, engines roaring.

Then, amidst the explosions and the chatter of gunfire, you hear it—a footstep, then another, just around the corner behind you. You wheel around, and raise your rifle....

If you don't take gaming audio seriously, that's one kill you're not going to get. Although graphics tend to get all the love among the enthusiast set, a nice pair of headphones can make the difference between full battlefield awareness and tunnel vision. And even if you're not the über-competitive type, great-sounding audio can take any game to a new level of immersion.

Fortunately, gaming headsets have been getting better and better, and this year's crop is the best we've ever tried. If it's time you upgraded to a quality headset, read on—we've reviewed six of the most impressive high-end solutions on the market today.


plantronics
MAD CATZ
G1
G2
G3
Logitech
RAGE
Sound BLASTER

PLANTRONICS GAMECOM COMMANDER

An awesome headset, if you can afford it

Don't let the subdued stylings fool you: This headset is a real beast.



IT'S ALWAYS FUN to see what a company can put together when it throws budgetary considerations out the window and pulls out all the stops. For Plantronics, the Gamecom Commander represents just such an effort—a completely over-the-top, luxury-tier product.

The Gamecom Commander doesn't feel like other gaming headsets. It's made of surprisingly heavy-duty plastic, with military-inspired oval earcups. Everything—the cups, band, wires, and microphone—feels more sturdily constructed than what we're used to. Each set is laser etched with an individual serial number, and the Commander comes with a removable Velcro strap across the top of the headband, which allows you to customize yours with a personal or team patch (not included). Even the cable is top-notch, with a proprietary snap-away connector (so you can quickly switch between multiple devices), an in-line remote, and a telephone-style spiral cord.

Sound quality is exceptional, with unparalleled accuracy and clarity among the sets tested for this feature. The bass response is clear, but less powerful than some of the other headsets tested. The Gamecom can be used as an analog set or with an included USB dongle that provides Dolby virtual 7.1 surround sound. As usual, the virtual surround is better than nothing, but not a replacement for the real thing.

We normally don't talk a lot about the microphones on gaming headsets, because they tend to run a pretty narrow gamut between "mediocre" and "decent." The Gamecom Commander is a different story, with a seriously heavy-duty mic with excellent noise cancellation and the best recording quality we've experienced in a gaming headset.

Even the Commander's packaging is exceptional. The set comes in a high-quality rigged nylon carrying case, which you can attach to anything with the included burly carabiner—if that's something you want to do.

Ultimately, the only thing that keeps us from unconditionally recommending the Gamecom is the price. It's an undeniably high-quality headset, but at $300 you're paying a lot for luxury. The sound quality is good, but you could do better with a $275 pair of audiophile headphones and a $25 desk mic. Still, if you want a traditional gaming headset and have money to burn, this could be the set for you.

VERDICT 9

Plantronics Gamecom Commander

$300, www.plantronics.com

HEADSET SPEC SPEAK

Like any other bit of PC hardware, headsets have developed quite a bit of related jargon. Here's a quick glossary of headset vocab that you might encounter in reviews and on store shelves. Knowing these terms will help you pick out the set that's right for you.

Analog vs. USB: Traditional headphones are analog—that is, they connect to an audio source using a normal audio connector. A USB headset connects to the PC using the USB bus, which allows it to process the sound before you hear it, increasing audio quality. However, USB headsets bypass any audio hardware you might have, so if you have a soundcard you should buy an analog set.

Wireless: There's a lot of wireless audio hardware out there, and most of it is bad news. Bluetooth audio is the worst culprit: Sound is compressed before it's transmitted, audibly decreasing quality. The kind of high-end wireless headsets found in this article transmit uncompressed audio and don't cause any loss of sound quality, but they don't come cheap.

Circumaural vs. Supra-Aural: All the sets in this roundup are circumaural, which means the earcups are meant to fit fully around the outside of your ear. Other sets are supra-aural, meaning they are meant to sit on top of your ears. Circumaural sets are better at keeping outside noise out, and your own audio in, but they tend to be heavier and more expensive.

Open-Back vs. Closed-Back: Open-back headsets do not form a complete seal around the ear. This can create a more natural-feeling sound, but allows sound to leak out more easily, potentially disturbing anyone nearby. Most gaming headsets, including all the ones in this article, are closed-back.

SOUND BLASTER TACTIC 3D RAGE WIRELESS

Wireless convenience without a huge price tag

The lights on the outside of the Tactic 3D Rage can be set to any color, and pulse while you play.



WITH THE Sound Blaster Tactic 3D Rage Wireless, you'll never feel like you didn't get your money's worth—this is the most feature-packed headset at this price point. Most notably, it's wireless, connecting to your computer with a USB dongle and charging via a removable, braided cable. Wireless headsets have been known to have some problems, like latency or interference, but we never experienced either with the Rage.

The Rage Wireless is a USB headset, and provides its own audio processing, which can be great if you don't have a discrete sound card. Sound Blaster is a company that obviously knows what it's doing in this arena, and the downloadable SBX ProStudio software has some nice features, including soundstage-broadening virtual surround and a Crystalizer that enhances and clarifies most compressed audio sources.

Our main gripe with the set is that it's not terribly comfortable. The leatherette-covered foam on the earcups and headband has a little less give than we like to see, and the whole set is quite heavy. We're also not crazy about the inclusion of a removable boom mic. It's flexible, and recording quality is fine, but between the removable mic, the removable foam windscreen, the wireless dongle, and the detachable charging cable, the chances of you keeping track of all the components of your Sound Blaster Tactic 3D Rage Wireless are slim to none.

At $100, this is one of the least-expensive quality wireless headsets on the market. If you're trying to cut the cord without breaking the bank, the Tactic 3D Rage is a good option.

VERDICT	
8	**Sound Blaster Tactic 3D Rage Wireless**
	$100, www.soundblaster.com

RAZER KRAKEN PRO

A midrange headset with a lot to offer

The Kraken Pro is available in both traditional black and a seizure-inducing green.



TONS OF BELLS and whistles are great, and we could argue about sound quality all day, but if your gaming headset gives you a migraine after a two-hour BioShock Infinite session, it's not doing its job. With the Kraken Pro, Razer has smartly emphasized comfort as a primary feature, with big, supple, circumaural earcups that swivel freely to line up with the contours of your head. In many of the headsets we've tried in the past, discomfort doesn't come from the earcups but instead from the headband, which can cause the top of your head to ache over time. The Kraken Pro finds a simple solution to this problem: It's lighter than most headsets of this size, reducing scalp-fatigue.

The Kraken features 40mm drivers, and sound quality is good, overall. Treble range sounds are crisp and clear, and the bass is strong but a bit muddy—a state of affairs that's common in gaming headsets, where the emphasis is on precisely picking out footsteps and distant gunshots, rather than on appreciating the nuances of a good bassline. They're great for Call of Duty, but if you're an audiophile, don't expect to get an amazing music-listening experience out of these.

Feature-wise, the Kraken Pro eschews the excesses of Razer's higher-end Tiamat headsets, settling on just the features we found most important. These include a flexible, retractable mic, high-quality build, and an included extension audio cable. Additionally, the set folds up for easy transportation.

VERDICT	
9	**Razer Kraken Pro**
	$80, www.razerzone.com

REPUBLIC OF GAMERS ORION PRO

Straightforward design and USB convenience

IF ORIGINALITY counted for much in gaming headsets, the Orion Pro would be the worst-reviewed product in this roundup. It's a simple design, with a padded headband and two large, circular earcups with cushy leatherette padding. It looks and feels a lot like other simple sets with super-size circumaural cups, such as the Corsair Vengeance line. Fortunately for Asus, originality doesn't matter nearly as much as comfort and performance, and this design is one of our favorites.

The aforementioned oversize earcups are comfortable for long play sessions, and create a good seal around the ear, providing impressive passive noise cancellation. Each cup contains a 50mm driver, which provides impressive sound quality. The bass response wasn't the most powerful of the tested sets, but clarity was good overall. Our only complaints with the feel of the set is that the cups don't pivot on the vertical axis like with the Razer Kraken, and that the leatherette cushions started to get hot quickly—a fabric option would have been nice.

The Orion Pro package consists of the Orion analog gaming headset, plus an additional USB audio-processor dongle, so you can use the headset in either mode. The processor has just three settings: FPS, Surround, and Amp. The options are not quite as impressive as the audio-processing suite in the Sound Blaster Tactic 3D line, but they have the distinct advantage of working without any software installation, and can be enabled or disabled on the fly with buttons on the dongle.



With installation-free USB processing, the Orion Pro is ready to grab and go.

VERDICT 8

Republic of Gamers Orion Pro
$110, http://rog.asus.com

LOGITECH WIRELESS GAMING HEADSET G930

A great case for cutting the cord

LOGITECH MAY not be the most exciting name in PC peripherals, but it's a company you can generally rely on for a solid product that does what it says on the box. The G930 headset doesn't disappoint.

The G930 is a wireless headset, with a number of practical extra features. The set comes with a puck-shaped USB device that powers the wireless transmitter dongle and simultaneously houses a pass-through charging cable. This allows you to charge and use the G930 at the same time, without using up two USB slots on your PC, as with the Sound Blaster Tactic Rage 3D.

Some of the joints on the headset are a little plasticky and creaky for our taste, but the earcups themselves have a nice range of motion, and are themselves quite solid and hefty. In fact, the set as a whole suffers from being a little too heavy. The padding on the headband is plenty thick, but we still started to get some dull head pain after just two hours wearing the set.

Our only other qualm with the G930's build quality is that the circumaural earcups don't provide as much sound isolation as some of the other sets in this roundup. Other than that, though, they're very comfortable, and they do a great job of providing crisp sound with a decent bass response and clarity. The G930 also features Dolby 7.1 virtual surround.

In all, this wireless set's got a lot to offer, though the cheaper Sound Blaster Tactic Rage makes a compelling alternative.



The G930 comes equipped with three user-bindable buttons on the earcup.

VERDICT 8

Logitech Wireless Gaming Headset G930
$160, http://gaming.logitech.com

MADCATZ F.R.E.Q. 7

Is this futuristic set worth the price?

Like all Cyborg products, the F.R.E.Q. 7 lays the futuristic aesthetic on thick.



ANOTHER HEADSET that's not for the faint-of-wallet, the MadCatz F.R.E.Q. 7 brings the Cyborg line's quirky design and high-quality construction to the gaming-headset realm. That line has so far been a bit of a mixed bag, providing some of our very favorite gaming peripherals, as well as a couple of so-so entries. The question is, where does the F.R.E.Q. 7 fall?

The common threads among all the Cyborg peripherals are their hyper-futuristic design and rock-solid construction. The F.R.E.Q. 7 is no exception, built out of metal and durable-feeling plastic and featuring a design that's sure to turn some heads. Though the set is on the heavier side, the extra-squishy rubber pad under the headband kept head pain to a minimum. The earcups are passable, but they're a little under-padded, and we felt like they applied pressure unevenly, pinching harder in the back than in the front.

Sound quality was quite good, overall, but in order to use the USB equalizer and other audio-processing features, we had to download drivers and software totaling 284 megabytes. Even in this broadband-connected age, we're willing to call that number unacceptable. This set also features Dolby 7.1 virtual surround.

One oddly frustrating thing about the F.R.E.Q. 7 is its volume wheel. In any high-end headset, we expect to be able to quickly adjust playback volume from the headset itself—usually with a button or roller on the earcup or on an in-line remote control located somewhere along the cable. The F.R.E.Q. 7 features a nice scroll wheel on the right earcup, but it is almost bizarrely unresponsive. Each spin of the wheel only barely moves the overall volume. In order to get the headset to go from minimum volume to maximum volume, we had to scroll, pick up our thumb, move it to the bottom of the wheel, then scroll again a total of *20–30 times.*

All the issues we had with the F.R.E.Q. 7 are minor problems or inconveniences and overall we still very much enjoyed the headset's sound quality, solid construction, and futuristic design. That said, every inconvenience is amplified when you spend $200 on a set of cans.

VERDICT 7

MadCatz F.R.E.Q. 7

$200, www.cyborggaming.com

AUDIO PROCESSING EXPLAINED

If you're using a laptop, or a desktop PC without a discrete sound card, you might be wondering what's with all the fuss about audio processing. If you plug a pair of speakers or a headset into your motherboard, you'll get sound that seems fine, so why should you shell out for a USB headset with built-in processing, or a sound card?

The idea is that, while your computer's onboard audio hardware is able to faithfully reproduce the sounds encoded in music, movies, and games, by processing that audio you can actually make it sound *better.* That seems a little too good to be true at first—after all, if it was possible to simply make a song sound better, why wouldn't they do that when they recorded it?

To answer that, remember two things. The first is that almost all audio files are compressed, one way or another. To make them use up less hard disk space, memory, and bandwidth, files such as MP3s are compressed, losing audio information. Further, to make songs stand out to listeners, recordings are usually subjected to dynamic range compression, which increases the overall perceived loudness of the song, at a cost of dynamic range. Some audio processing, such as the SoundBlaster Crystallizer, attempts to algorithmically restore data lost during both types of compression.

The second thing to keep in mind is that not all audio hardware is created equal. Equalizer features and bass boost can help take advantage of the strengths of your hardware, and shore up its weaknesses, while virtual surround sound processing (such as the Dolby 7.1 Surround processing found in several of the headsets in this roundup) takes a surround sound audio source and algorithmically reduces it down to a stereo output, employing psychoacoustics to trick you into perceiving more sound sources than actually exist.

iFixit presents:

AUTOPSY

THIS MONTH WE DISSECT...

Sonos Play:3 All-in-One Wireless Music Player



About iFixit

iFixit is a global community of tinkerers dedicated to helping people fix things through free online repair manuals and teardowns. iFixit believes that everyone has the right to maintain and repair their own products. To learn more, visit www.ifixit.com.



BACKGROUND:

The popularity of digital musical content demands new and innovative way of listening to our music. This small portable speaker, which connects to your wireless router with the included Ethernet cable, or wirelessly with the Sonos Bridge, lets you enjoy room-filling sound from the Internet, your computer, or networked-attached storage. Here's what's inside.

MAJOR TECH SPECS:

• MPC8314VRADDA low-power PowerQUICC II pro 266MHz processor
• STMicroelectronics NAND 512W3A2SN6
• Nanya NT5TU32M16DG-3C 512MB DDR2 RAM
• STMicroelectronics STA339BW 2.1-channel high-efficiency digital audio system
• Ethernet port
• AC 120/240 V power supply port

KEY FINDINGS:

• A flick of our spudger allowed us to remove the front speaker grill with relative ease, although the gooey adhesive on the perimeter clips was reluctant to let go. Ten screws later, the front bezel was on its way out.

• How difficult is it to replace the two midrange drivers and the one tweeter? Not very. Each is held in by four Phillips screws.

• Inside the Sonos Play:3 is a playground of wires and circuit boards, arranged methodically for space efficiency.

• Getting to the Play:3's motherboard was no Herculean task, even though it did require defeating the Hydra cables, as well as some Phillips screws.

• We found three antennas in the Sonos Play:3, all attached to a communications card on the motherboard and held in place with a soft glue.

• Proceeding with caution, we carefully removed the "AC 120/240V, 50–60Hz, auto-switchable" power supply board, populated by an array of capacitors and inductors. The smallest rattle or vibration inside the Play:3 will cause quite the uproar (and probably a product return), so everything is firmly glued in place.

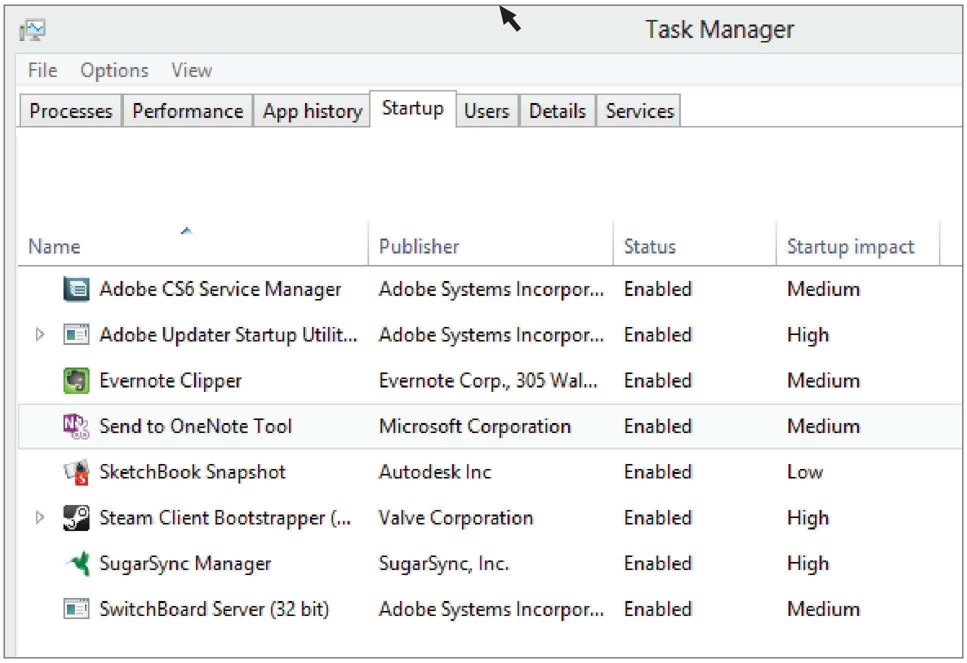
• At long last, we found the advertised bass radiator, a passive speaker cone secured in the very back of the case that forms an inexpensive alternative to a powered subwoofer.

• Sonos Play:3 repairability score: 8 out of 10. All major components are held in place with Phillips screws, many of them the same size; the entire disassembly is pretty straightforward; a modular design means that nearly every component can be replaced individually; glue and adhesive are not impossible to overcome, but definitely need to be reapplied to dampen vibrations; a "warranty void" sticker stands between you and any repairs.

HOW TO

STEP-BY-STEP GUIDES TO IMPROVING YOUR PC

WINDOWS TIP OF THE MONTH



USE WINDOWS 8'S BUILT-IN STARTUP MANAGER

One new feature in the much-improved Windows 8 Task Manager is a built-in Startup manager, which allows you to keep programs from starting when you boot your PC. To access it, just start the Task Manager (Ctrl + Alt + Del), and click the Startup tab. Right-click a program to find the option to disable it.

MAKE - USE - CREATE







ALEX CASTLE
CONTRIBUTING EDITOR

CUSTOMIZE THE WINDOWS TASKBAR

WITH OR without the Start button, the taskbar is one of most important parts of the Windows desktop. Perhaps because it's so central to the Windows experience and so iconic (pun intended), a lot of people don't realize that the taskbar is highly customizable. All you have to do is right-click it, choose Properties, and have a look around. Here are a few of the things you can change:

Orientation: You can tell the taskbar to snap to any of the four edges of your screen. Further, if you unlock the taskbar, you can drag one edge of it to make it larger, allowing more room for icons.

Button Behavior: If you preferred the pre–Windows 7 taskbar behavior, you can click the Taskbar Buttons pull-down menu, and choose Never Combine.

Toolbars: There are also a handful of interactive toolbars you can add to the taskbar, such as one for URLs, or for desktop search. To add or remove these, just go to the Toolbars tab.

↘ submit your How To project idea to: comments@maximumpc.com

Get into Windows if You Forget Your Password

YOU'LL NEED THIS

WINDOWS 7 INSTALL DISC
Using the disc to "repair" your installation gives you an opportunity to change the password.

OPHCRACK
In the event that you don't have an install disc, this password cracker can help you out: http://bit.ly/zRGei.

HAVE YOU EVER forgotten your Windows password and locked yourself out of your PC? It's a nightmare, but there are several ways to get back in, depending on the resources at your disposal. We're going to explore the method a professional hacker would use to get into your PC. It's straightforward and uses your Windows 7 installation disc, which contains all the tools you need to get in and change the password.

The technique we'll use contains a real-life hack. We'll replace the Sticky Keys executable with a command prompt, so that even without logging in, we can pull up a command line and change the password, then use it to log in. If you don't have a Windows installation disc, another option is to load up a password cracker. We'll show you how to do that, using the industry-standard Ophcrack.

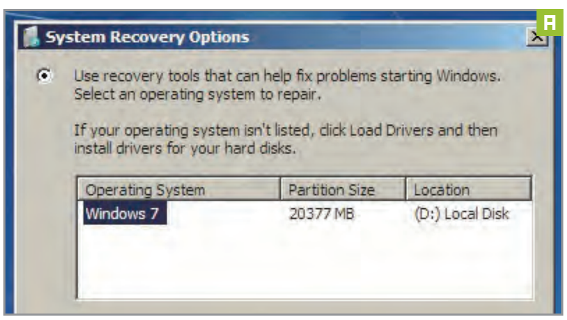
Remember, you should only use these techniques to access a computer that you own. Hacking into another person's machine is a criminal offence. –JON THOMPSON

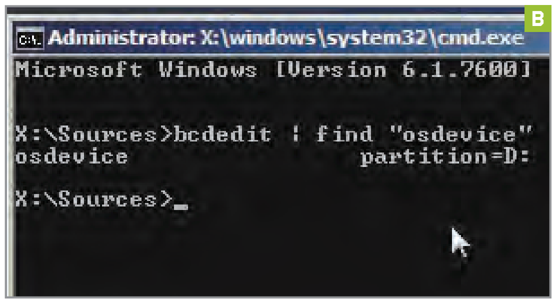
1 PERFORM THE WINDOWS REPAIR HACK To reset your Windows user account password, you must first boot the computer from the Windows 7 installation disc. With the disc in your optical drive, power on your PC, and when given the option to boot from DVD, quickly hit any key to boot. After Windows loads its installation files, you'll be shown the language setup page. Select your country to set up the keyboard, then click the Next button.

» Click "Repair your computer." The repair software takes a few moments to load from the installation disc, then begins examining the computer's hard disk boot table, looking for any current Windows 7 installations to repair. Unless you've installed many copies of the operating system by hand, there will be just one installation (image A), so click Next to continue the recovery process.

» The resulting screen gives you many options. Click Command Prompt and one appears. The C drive is usually not mounted as C at all. To find its current drive letter, type in **bcdedit | find "osdevice"**. This command results in text ending in **partition=** and a drive letter (image B). This is the letter you should use instead of C in the following step.

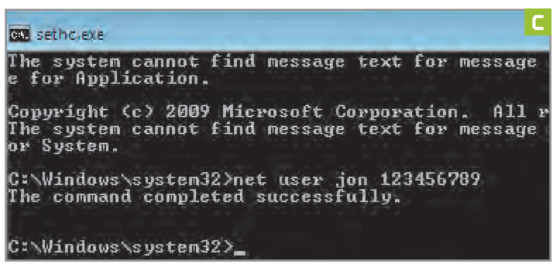
» Enter the following commands. Take care to ensure that you use the correct driver letter in place of C: **copy c:\windows\system32\sethc.exe c:** then **copy c:\windows\system32\cmd.exe c:\windows\system32\sethc.exe**. When prompted, confirm the second command by typing **Yes**. The first command backs up a file, and the second replaces it with the command prompt. As mentioned earlier, what we're doing with this hack is replacing the Sticky Keys application with an executable for the command prompt. Since the Sticky Keys program can be launched at any time (even at the login screen), this will allow us to get command-line access to the system without ever getting past the boot screen.

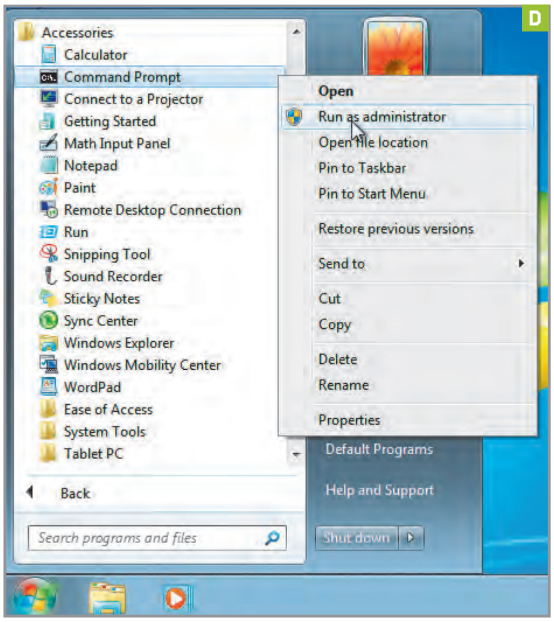




2 CHANGE THE PASSWORD USING THE COMMAND PROMPT Remove the installation disc and reboot. On the login screen, press the Shift key five times in a row (the Sticky Keys hotkey). As if by magic, a command prompt appears. Enter the following command: **net user <name> <new password>** (image C). Substitute the name of the account to reset and a new password as appropriate. Close the command prompt and enter the new password to log in.

» The final step we must take to restore access is to restore the sethc.exe file we overwrote in Step 1. To do that, click Start > Accessories, right-click Command Prompt and select "Run as Administrator" (image D). This gives you the right to copy sethc.exe back into the system32 folder. Now enter the command **copy c:\sethc.exe c:\windows\system32\sethc.exe.** Confirm the copy to finish.



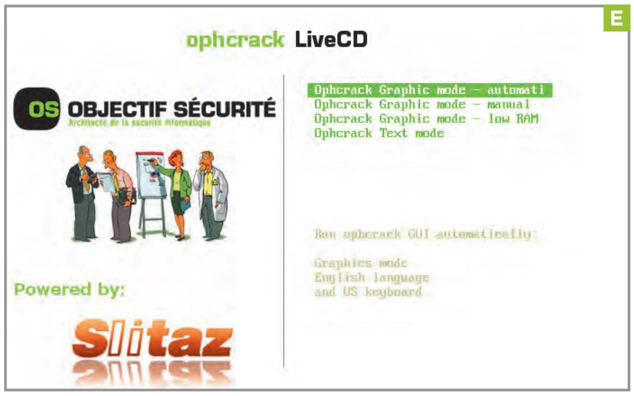


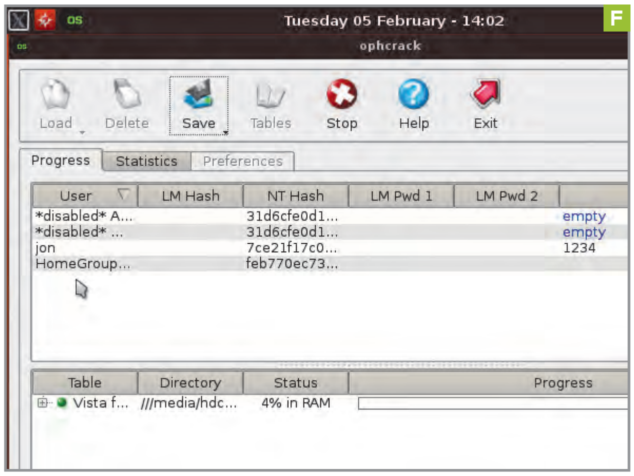
3 **CRACK WITH OPHCRACK** To crack an unknown password, we need a heavy-duty password cracker like Ophcrack. You can download it from http://ophcrack.sourceforge.net. Insert a blank, formatted DVD-RW, then right-click the downloaded image and select "Burn disc image." The disc being written is a bootable live CD containing Linux and Ophcrack.

» Once the DVD has been written, boot the affected computer and the DVD should begin to automatically load the Ophcrack software, which runs outside of Windows. Once done, a menu should appear offering several options for running Ophcrack (**image E**). Either press Enter, or wait for the timeout and automatically select the Ophcrack graphic mode.

» Short passwords such as "1234" or "password," will fall to Ophcrack almost immediately because the software tries these first in a brute-force attack. Complex passwords take more time, and the longer the password the longer it will take to crack—if it can be cracked at all. A complex password may take several hours to crack. If Ophcrack uncovers the password, it will be displayed in the NT Pwd column (**image F**). Ophcrack doesn't store the passwords, so make a note.

» Finally, let's perform a deep scan of the whole computer to reveal all passwords associated with Windows user accounts. Close any windows and double-click Launcher. Scroll down to DeepSearch (**image G**) and press Enter. Ophcrack will search all available media—not just the system volume—for any password files, and then perform its cracking wizardry.







Connect to Your PC from Anywhere with RDP

YOU'LL NEED THIS

WINDOWS
The computer that you wish to connect to will need to be running Windows Pro, Business, or Ultimate. The connecting computer can be running any version of Windows.

A STATIC IP
If you don't have one, you can get the next best thing at www.no-ip.com.

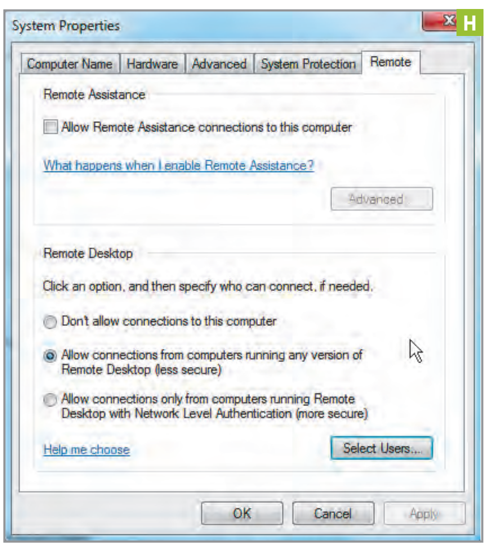
WHAT IS WINDOWS RDP? It's the service that enables you to log into a networked Windows PC remotely as if you were sitting right in front of it. It's a great tool for accessing headless servers, or just for the lazier folks among us who can't be bothered to get up to sort out a PC issue in another room. RDP (remote desktop protocol) is great because it's a standard part of Windows and it's super-fast—rather than streaming the entire desktop image (as services like LogMeIn do), it can get away with capturing just the underlying data structure to recreate the Windows desktop locally. More importantly, Windows RDP ties into the existing Windows Groups and User system. This means it can be made pretty secure. There are some restrictions on the versions of Windows that can instigate an RDP server, but any version can access a running server, so that's where we'll get started. You can use any version of Windows to connect to a PC running Windows RDP service. The issue is that generally only the Pro, Business, and Ultimate versions offer the Windows RDP host service, which is the bit that sends the desktop. If you're running Windows Server—yes, it's unlikely—you're also good to go, but be aware that only one user at a time can see the screen. –NEIL MOHR

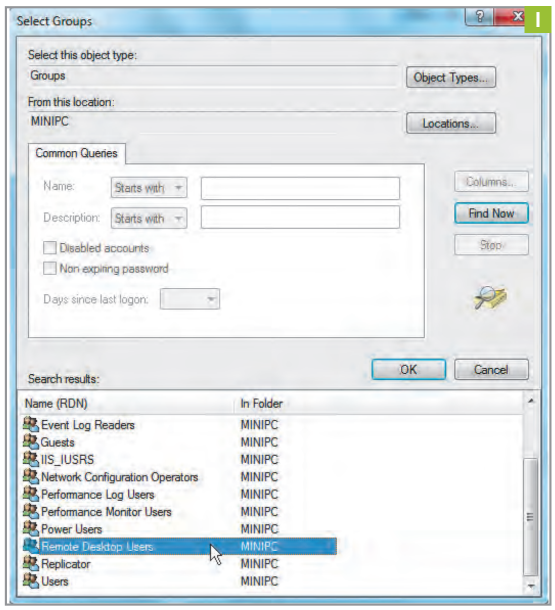
1 SET UP USER ACCOUNTS Before starting anything, we need to set Windows so it'll accept Windows RDP connections. Right-click Computer in the Start menu and choose Properties > Remote settings. In the Remote Desktop section, select the middle Allow… option (**image H**). The last option will enhance security, but you need the latest Windows updates.

» To add existing users for remote access, click Select Users… and then the Add button, but for extra security consider creating a new user account with restricted permissions. To do this, right-click Computer, select Manage > Local Users and Groups > Users and then Action > New User.

» Anyone can potentially access this over the Internet, so choose a complex username and a strong password. A long, memorable password is better than a short random one, or even a short word with a number and capitalization. Deselect the Change option and tick Cannot Change.

» Create the new user, double-click the entry and click Member of > Add > Advanced > Find Now > Remote Desktop Users to add RDP privileges (**image I**). You may want to remove this from any other accounts. You can also move them from the Users group to the Guest group for restricted access.





2 PREPARE YOUR NETWORK Before continuing, you should check that RDP and the new user account are working. Jump on another PC or RDP client and try to log in over your home network. Click Start, type **Remote Desktop Connection** and run it, or find it in the Programs > Accessories folder. Enter the remote PC's name or IP address to get going.

» Windows RDP server works over TCP port 3389. For additional security, we'll connect to the router over the Internet to a randomly selected port. The available range of general ports is from 1024 to 65536. Depending on your router, configure it to forward that port to the IP of your PC and to port 3389 (**image J**). Try www.portforward.com if you don't know how.

» Again, this depends on your broadband router, but somewhere in its interface you'll find the external IP address your ISP has assigned to your router. Try looking in the "Logging" or "Internet" section. You can Google "What's my IP" and the search engine will tell you. If you don't have a static IP then you'll need a DDNS service like those offered by www.no-ip.com.



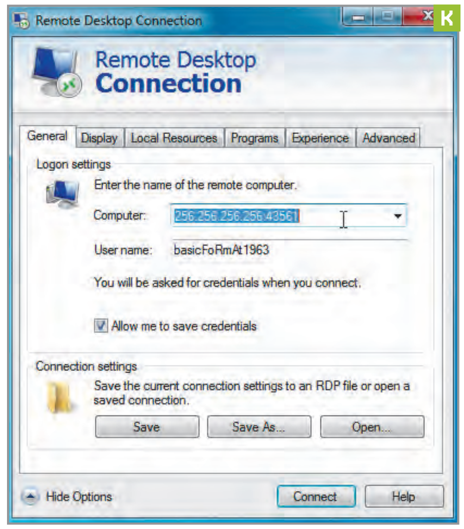
3 CONNECT REMOTELY

So, how do you connect to a remote desktop that's using its own port with the Remote Desktop Connection program? Under the Computer section you need to enter the external IP of your router, then a colon, then the port number—all with no spaces. Press the down arrow and you can also add the username, which will be used to log in (**image K**).

» Click the Experience tab to see how you can speed up your remote desktop experience. You can leave all the options off, but Visual Styles and Desktop Composition don't slow things down too much. Under Display you can select a lower resolution and reduce the color depth, although this might rearrange your desktop.

» To really test this out, you'll need access to a connection outside your own home network. For many, the easiest option is to fire up your smartphone and use it to create a wireless hotspot or access the remote system from it directly. Bear in mind that this will connect via the mobile network, so data charges may apply.

» So far we've only talked in terms of access from other Windows systems. But Windows RDP clients exist for all systems including Android and Apple iOS. 2X Client offers free apps (www.2x.com/rdp-client) for a wide variety of platforms (**image L**). Download the one that suits your needs and configure it the same way as the Windows one we've covered.

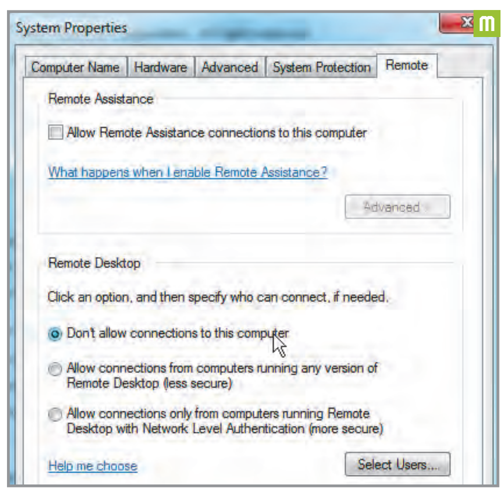




4 TWEAK RDP SECURITY

Windows Firewall is pretty comprehensive, and you can restrict RDP access to systems from specific IP addresses. If you know these details, it can be a very secure option. Click Start, type **Firewall**, and select Windows Firewall with Advanced Security. Select Inbound rules > Remote desktop > Scope, and set the IP here.

» If you no longer need external access, there's a level of tidying up that will secure your system again. First, remove the forward port from the router. Second, remove remote access privileges or remove the user from the system entirely (**image M**). Finally, if you don't plan to use it, you can remove remote access, reversing Step 2 entirely.



BUILD IT

TOM MCNAMARA **ASSOCIATE EDITOR**



A Quiet-but-Powerful Gaming Rig

We love Pure PC Power, and hate noise, so we set out to satisfy both primal desires with a hand-built and almost totally silent gaming PC

LENGTH OF TIME: **2–4 HOURS** | LEVEL OF DIFFICULTY: **INTERMEDIATE**



THE MISSION Powerful computer components often run hot, which requires loud fans or expensive liquid to cool them, bringing us to a central conundrum of the PC Power lifestyle—we want a big, powerful PC, *but* we want it to make as little noise as possible. Not only do noisy computers make it more difficult to relax, but there's a principle at work here—you should be the master of the space where you put your PC; you must bend it to your will, not the other way around.

This month, we decided to do just that and build a supremely powerful rig, then smother its noise output as best as we could. We haven't built a PC like this in a while, so the project gave us the chance to check out some new gear specifically designed for quiet computing, including a fanless CPU cooler from Zalman, a case fan from a company that usually only operates in Europe, and a closed-loop liquid cooler built for video cards. We stuffed it all into a "new to us" case from Fractal Design, and then tried to overclock the PC because, well, that's what we do here.

STARTING OUT, we figured the thing that would probably make the biggest difference in our build (besides the components, of course) would be sound-absorbing panels. This would allow us to have some fans inside the system, as building a fanless PC with any amount of horsepower is simply impossible. Therefore, we went with Fractal Design's Define R4—a mid-tower known for its sonic excellence and balance of price and features.

We also liked the idea of a fanless CPU cooler, as Zalman had just released the FX100 cooler, and it would mean a major element of our machine would be totally silent even when running at full speed. The only problem is it would also pretty much guarantee that we wouldn't be able to overclock due to heat buildup, which is always a problem with fanless coolers. Zalman also sent us a 92mm fan that could be dropped into the center column of the heat sink if we ran into cooling issues. Zalman labels the fan as "optional" for those running socket 2011 or 1133, but we would add "overclockers" to that list, as well. A company named Be Quiet had just sent us two 14cm Silent Wings 2 case fans, one of which we slapped in the front of our case for some additional airflow.

In the GPU department, we happened to have an Nvidia GeForce GTX 680 with a closed-loop water cooler from Arctic Cooling that includes a 120mm radiator and fan, so we used that since it's just what the rig-doctor ordered. Rounding out our components was a quiet PSU from Cooler Master, a solid-state drive from OCZ, a 1TB Caviar Black hard drive from WD, and a couple of sticks of RAM from Corsair.

INGREDIENTS

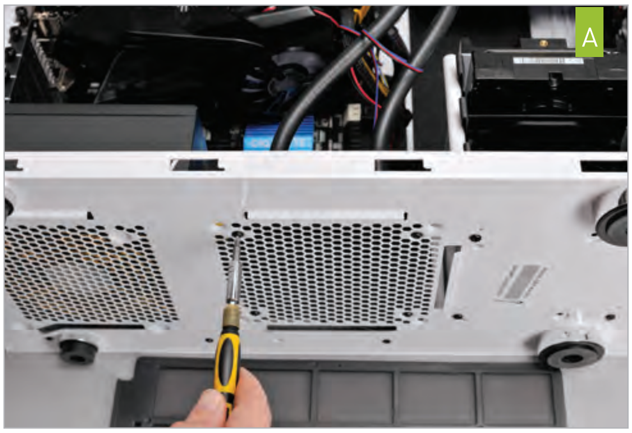
	PART	PRICE
Case	Fractal Design Define R4	**$110**
Case Fan	Be Quiet Silent Wings 2 14cm	**$20**
PSU	Cooler Master 800W Silent Pro Gold	**$150**
Mobo	Gigabyte GA-Z77X-UD3H	**$135**
CPU	Intel Core i7-3770K	**$325**
CPU Cooler	Zalman FX100	**$70 (street)**
GPU	Nvidia GeForce GTX 680	**$450**
GPU Cooler	Arctic Cooling Accelero Hybrid	**$110**
RAM	Corsair Vengeance 2x 4GB	**$55**
SSD	OCZ Vertex 4 128GB	**$125**
Hard Drive	WD Caviar Black 1TB	**$90**
OS	Windows 7 64-bit OEM	**$100**
TOTAL		**$1,740**

1 HYBRID THEORY

WE DIDN'T WANT to sacrifice video card performance to achieve low noise, so we got creative. Last month, we installed an Arctic Cooling Accelero Hybrid closed-loop liquid cooler on an Nvidia GeForce GTX 680 (these don't run as toasty as comparable AMD cards like the Radeon HD 7970, making our job a little easier). The Hybrid is basically like a Corsair H100, but designed for GPUs. Since we awarded it a 9 verdict and Kick Ass award for running so cool and quiet, it made sense to tuck this puppy into our build. The Fractal Design case we chose had an unoccupied 120mm fan grill on the bottom of the case, next to the power supply, perfect for our Hybrid's radiator and fan (**image A**). It's difficult to hear noise coming through the bottom of a case, so we used that to our advantage.

2 EUROPEAN STYLING!

WE WERE looking forward to working with the Fractal Design Define R4 case for more than just its built-in sound-dampening panels. It's also about an inch wider than normal, so there's more room behind the motherboard tray for cable management. (The extra width also leaves room to add a 140mm radiator to the rear exhaust fan, but we don't need that feature this time.) In addition, the drive cages have preinstalled rubber feet designed to absorb the vibration of a mechanical drive's moving parts (**image B**). We also decided to remove the upper drive cage, which was secured with a couple of thumbscrews, to increase airflow in the middle of the chassis where our GPU is located. Besides, we didn't need the second drive cage since we were fine just using the three bays in the lower cage. The power supply mount also has rubber feet, and a gasket in the rear that helps with sound absorption and dust prevention.



A



B

3 ON SILENT WINGS

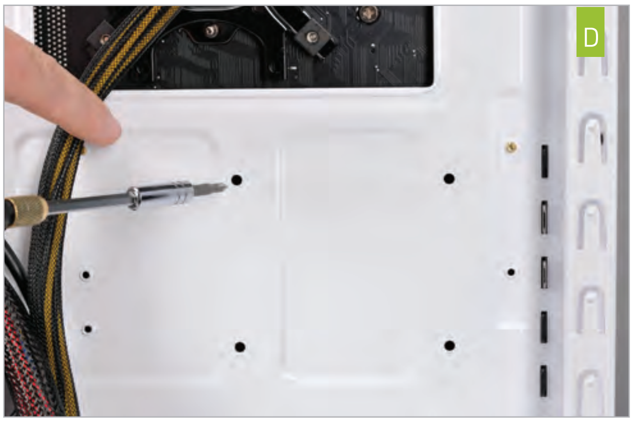
EVEN THOUGH THE case includes one intake fan and one exhaust fan, we wanted a third case fan to help provide some airflow to our fanless CPU cooler. The R4 has two intake fan mounts in the front, and we weren't worried about adding an extra fan to a "quiet PC" because the added noise would be muffled by sound-dampening material. We used the unoccupied lower mount to install the Be Quiet Silent Wings 2 fan, which is like the R4's stock fans in that its blades are shaped to reduce turbulence.

To install it, we just pressed on the fan grill to pop it open, affixed the fan to the included cage, then snapped it shut—no tools needed (**image C**).


C

4 THE DRIVE TO WIN

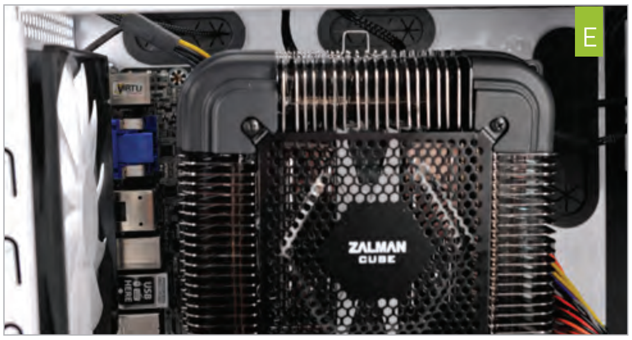
WE DECIDED to skip an optical drive, since they can make a lot of noise when they spin up, and just installed Windows from a USB stick. For our OS we naturally wanted a solid-state drive since they have no moving parts and make no noise, so we went with an OCZ Vertex 4 because it's one of the best performers at 128GB and its size is sufficient for our OS needs. The Define R4 allows you to install two SSDs underneath the motherboard tray, between the board and the case. But the screws go through the *top* of the tray (**image D**), so the motherboard needs to be removed to install the drives. For simplicity's sake, we installed the SSD next to the mechanical drive in the lower drive cage, as its slide-out trays have screw holes for SSDs. There was enough room between the back of the drives and the side panel that right-angle SATA cables were not required.


D

5 ONE LESS FAN

WE REALLY liked the idea of using Zalman's new fanless CPU cooler for this build, since it's totally silent and would go a long way toward minimizing our machine's sound output—after all, the CPU cooler, along with the GPU cooler, is responsible for the lion's share of the noise a system emits. Since we already had the GPU on a liquid diet, silencing the CPU too should make our machine so quiet not even a bat could hear it. Of course, we also wanted a high-performance machine, so we were taking a bit of a gamble on whether a fanless cooler would work, but we figured it was worth a try.

Since it's a passive cooler, the Zalman is absolutely massive. This made plugging things in around the CPU socket tricky, as the cooler mostly obstructed the 8-pin motherboard power connector (**image E**). The CPU fan header was also completely out of reach (Zalman bundles an optional 92mm ZM-SF2 fan). You can install the cooler with the fan before putting your motherboard in the case, but then the cooler blocks the 8-pin connector. With the fan plugged in, we had to tilt the board about 30 degrees to wrestle the 8-pin cable into its socket.



E

6 FIGHTING THE POWER

POWER SUPPLIES are another area where we can eliminate noise. When your system starts demanding a lot of power, that power amounts to a lot of heat going through the PSU. Its fan may have to spin pretty hard to keep up, so you want a PSU with a fan that won't create a lot of turbulence when you crank it to 11. We began our build with a Cooler Master 720-watt Silent Pro M2, and as its name implies, it's designed to operate quietly. We'd used it in a previous build, so we could confirm it would not emit more than a low hum. It seemed like a no-brainer to drop in our Define R4 case.

Unfortunately, the M2 was about a half-inch too long, and didn't leave enough room for the Accelero Hybrid radiator, which we mounted on the bottom fan grill next to the PSU. It seemed simpler to just get a different PSU rather than mount the Hybrid where its fan would be easier to hear. We had several other options on hand and ultimately chose the Cooler Master Silent Pro Gold (**image F**) because it has received positive reviews for its silent operation.



F



1. The Zalman FX100 fanless CPU cooler dominates the upper half of this case. But its cube shape caused some cable routing (and heat) issues.

2. The closed-loop liquid cooler on the Nvidia GeForce GTX 680 takes up a lot of room, but it ensured that the GPU's heat exited the case and made the GPU whisper-quiet, too.

3. We decided to mount our GPU's radiator in the bottom of the case, which required a power supply that was shorter than 6.5 inches (about 165mm).

4. The Fractal Design Define R4 case is made for silence, with built-in noise-absorption panels, rubber feet in the drive cage, and a gasket around the rear of the PSU to absorb vibration.

SILENT BUT DEADLY

ALTHOUGH IT took time and some creativity to fit the FX100 fanless CPU cooler into the Define R4 case (due to the cooler's unusually large dimensions and the case's midsize stature), it was able to keep our Core i7-3770K in the mid-70s Celsius with Prime95 running its most challenging test (in-place large FFTs). That's not too shabby for a fanless cooler, especially considering that our CPU was running eight threads at 100 percent load. If you place a high premium on low noise and don't care about overclocking, this cooler may fit your needs, assuming you can wedge it into your chassis. In retrospect, we would have preferred either a smaller cooler or a larger case, as this particular combo provided woefully little clearance between the top of the motherboard and the top of the case, making connecting the 8-pin power cable up in the corner of our mobo a major chore. Many full-towers fit that description, and Fractal Design makes a full-tower version of this case called the Define XL R2.

After we installed the FX100's optional 92mm fan (found at Frozencpu.com for $18), CPU temps were about on par with similar-size "skyscraper" coolers like the Noctua NH-D14 or the Phanteks TC14PE, with idle temps in the low-to-mid 30s Celsius and load temps in the high 60s, and it operated about as quietly. We were also able to get a stable overclock of 4GHz (from a stock speed of 3.5GHz). Going higher created noticeable fan noise when the system was under load, even with the sound dampening in the R4.

Putting the Accelero Hybrid radiator on the bottom of the Define R4 chassis gave us the quietude we had hoped for, even when running GPU benchmarks. The Hybrid device includes a small fan blowing on the card, so the memory and voltage regulation modules didn't overheat. Since this fan didn't have to cool the GPU, it didn't have to work nearly as hard, so it stayed nice and quiet.

Overall, this build was one part cooling experiment, and one part PC-building exercise. Though our final system was dead quiet, it took us awhile to get there, thanks to the quirks of the fanless cooler and the stringent low-noise requirements we set for ourselves. Given a second shot, we'd go with a standard CPU air-cooler with fans first, or water cooling. Maybe next time we'll cool both the GPU and the CPU with water, and maybe even try something as exotic as an exterior radiator/reservoir.

BENCHMARKS

	ZERO POINT	
Premiere Pro CS6 (sec)	2,000	2820 (-29%)
Stitch.Efx 2.0 (sec)	831	836
3DMark 11 Extreme	5,847	3390 (-42%)
x264 HD 5.0 (fps)	21.1	15.5 (-26%)
ProShow Producer 5.0 (sec)	1,446	1427 (-1%)
Batman: Arkam City (fps)	76	49 (-35%)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a hexa-core 3.2GHz Core i7-3930K @ 3.8GHz, 8GB of Corsair DDR3/1600, on an Asus Sabertooth X79 motherboard. We are running a GeForce GTX 690, an OCZ Vertex 3 SSD, and 64-bit Windows 7 Professional.

REVIEWS

TESTED. REVIEWED. VERDICTIZED.

INSIDE



CORSAIR H100i CPU COOLER PAGE 81

REVIEWS

TESTED. REVIEWED. VERDICTIZED.

INSIDE





An SSD would greatly help the performance of this tiny PC.

Sapphire Edge VS8

A feisty little machine

CONSIDERING HOW POORLY AMD's A-series APU did in our "Battle of the Budget Builds" (June 2013), you'd think that type of chip would be outclassed by its AM3+ siblings and Intel's crew in *all* scenarios. But, while that's true in the case of big desktops, when you miniaturize the chassis to something you can slip into your murse, things get a bit more competitive. Such is the way with Sapphire's Edge VS8 mini PC. Built around AMD's A8-4555M mobile chip, this quad-core proc boasts a 1.6GHz chip that Turbo Clocks up to 2.4GHz. Boxes this small have typically included Intel Atom and AMD E-450 series chips, and though both are getting better, they are pretty weak CPUs. AMD's A8-4555M, on the other hand, uses the fairly powerful Piledriver dual-core modules on the x86-side of things, and a Radeon HD 7600G for graphics. Initially, we thought we'd compare the Edge VS8 to an older E-450 or Atom-based mini PC, but the pricing of the Edge VS8 puts it firmly in the neighborhood of Intel's Core i3-3217U-based NUC. That's because to get the $300 NUC up and running, you'd need to add an mSATA SSD, RAM, wireless card, and OS, pushing the price to $600.

In general compute performance, we found the A8-4555M couldn't quite go head-to-head with the Core i3-3217U, but it put up a decent fight, and was nowhere near as dog-slow as an Atom or E-450 processor. In ProShow Producer, the Edge VS8 was about 17 percent slower than the i3-based NUC and 34 percent slower than the NUC in Stitch.Efx 2.0. In gaming, the Edge VS8 got its payback, cranking out a 3DMark 11 score that was about 47 percent faster than the NUC's HD4000 graphics. When performance was isolated to just the GPU, the Radeon HD 7600G produced a score about 61 percent higher. We put the NUC's graphics capability in real games at something akin to Portal 2 on low settings. The Edge is definitely better equipped for gaming, but at 1600x900 rather than 1080p.

In our opinion, the Edge VS8 is better suited for HTPC applications. Here it excels with enough computing power to drive even the new PowerDVD 13 and its new real-time frame-by-frame sharpening algorithms. PowerDVD 13 played HD-res files as well as Blu-ray discs just fine. There were a couple of hitches when trying to skip forward several chapters, but it quickly smoothed out after a few blips. Of course, you'll need a USB Blu-ray drive to play actual discs, but the Edge VS8 had plenty of pep to do that.

Overall, Sapphire's Edge VS8 does a great job of fulfilling all our HTPC streaming needs. Our primary complaint is probably with its 500GB laptop drive. We've become so accustomed to SSD performance that we forgot how slow laptop hard drives can be. Any enthusiast can quickly swap out the drive for an SSD, though, by opening the case. Once inside, you'll also see a pair of SO-DIMMs and the machine's sole source of noise: a small heat pipe and fan. Externally, the Edge VS8 features a nice rubberized finish with a built-in stand. The machine can lie on its side but it will wobble a bit.

An SSD would greatly help the out-of-the-box performance but it would also exacerbate our other complaint, which is that once an OS is added (yes, it ships sans OS), the cost tips $550. That's within striking distance of the NUC outfitted with a 128GB mSATA SSD and 8GB of RAM, plus OS. We wish the Edge VS8 was about $100 cheaper, but once you get down to the $350 range, you're back into the sluggish territory of Atom and E-350/E-450 parts. Still, it's a powerful enough box with a healthy graphics advantage over the NUC.

–GORDON MAH UNG

VERDICT 8

Sapphire Edge VS8

+ SAPPHIRES Quiet; fairly powerful graphics; plenty of ports.

− DIAMONDS Needs SSD; could be cheaper.

$450, www.sapphiretech.com

BENCHMARKS

	ZERO-POINT	
ProShow Producer	3,633	4,369 (-17%)
Stitch.Efx 2.0	2,403	3,649 (-34%)
3DMark 11 Overall	610	898
3DMark 11 Graphics	529	851
3DMark 11 Physics	2,523	1,670 (-34%)
3DMark 11 Combined	622	672

Our zero-point is an Intel NUC using a Core i3-3217U, 8GB of RAM, a 120GB Intel M520 SSD, and Windows 8.

SPECIFICATIONS

CPU	AMD 1.6GHz A8-4555M
RAM	4GB DDR3/1333
Storage	500GB WD Scorpio Blue
Networking	802.11b/g/n, Bluetooth 3.0, Gigabit
Ports	1 Mini Display Port, 1 HDMI, Gigabit, 4x USB 2.0, 2x USB 3.0, optical SP/DIF, SD card reader

The M500 is the first SSD to offer a relatively affordable 1TB option. Who needs kidneys, anyway?



Crucial M500 480GB SSD

A winning package of low price and high performance

THE CRUCIAL M500 is the company's third-generation 6Gb/s SSD, and the successor to the often-praised M4 SSD, which we named the "Best Bang for your Buck" SSD back in December 2012 due to its well-rounded package of decent performance at a great price. In our estimation, the new drive follows suit, though with much-improved write speeds and massively increased capacities at lower prices, thanks to its move to smaller-process NAND flash. Not only does it come in the standard 120GB, 240GB, and the 480GB version you see before you, but it's also offered in a pants-tightening 1TB version at just $600, making it the only truly affordable 1TB SSD ever offered. Since the terabyte drive was not available at press time, we're taking a look at the 480GB version, which sports the exact same specs as its big brother.

The drive itself comes in a shiny 7mm silver enclosure, so it fits into some thinner notebooks. A 9.5mm spacer is included, but not a 3.5-inch adapter, nor is there any software in the box or online aside from a firmware updating tool, which is disappointing. Inside the M500's shell we find that Crucial has moved from 25nm NAND to 20nm MLC NAND flash. Smaller-process NAND offers benefits such as lower power consumption and increased capacities, but also reduces the NAND's life span somewhat. Still, Crucial offers the drive with a 3-year warranty and says the drive can handle 40GB of data written to it every day for five years, so the drive's NAND should last long enough even for hardcore data-mongers. Crucial is still using a Marvell controller, though it's an updated version of the one used on the M4, and, of course, it has updated firmware.

In testing, we saw the M500 post very respectable scores across the board, though none were the fastest we've seen, nor would we expect them to be at this price. The biggest improvement we see over the M4 is in write speeds, which have gone from 193MB/s in CrystalDiskMark to 422MB/s, and that difference shows in the AS SSD compressed-data test as well, showing almost a doubling of speed from the M500. The ATTO test mirrors our other results, showing the drive capable of around 500MB/s read speeds and 422MB/s write speeds, which is superb for a "value" drive. Its Iometer score of 83,354 IOPS is also top-of-its-class as well, as is its PC-Mark Vantage HDD test score of 71,619. Oddly, its Sony Vegas score is unchanged from the M4, so it's possible the Marvell controller still has a tough time with data-compression duties when writing huge files, 20GB in our scenario.

Overall, the M500 shows just how far value drives have progressed, since this drive is about as fast as the fastest SSDs available a year ago. When compared to its most direct competitor—the Samsung 840 500GB—the two are pretty evenly matched, though the Crucial drive was a little faster in more tests. However, the Samsung drive costs about $40 less, has the same warranty, and better software support, making it a nail-biter between them. –JOSH NOREM

BENCHMARKS

	Crucial M500	Crucial M4	Samsung 840
Controller	Marvell 9187	Marvell 9174	MDX
Capacity	480GB	256GB	500GB
CrystalDiskMark			
Avg. Sustained Read (MB/s)	480	**500**	464
Avg. Sustained Write (MB/s)	**422**	193	333
AS SSD			
4KB Read (IOPS)	6,388	6,741	**6,921**
4KB Write (IOPS)	**17,003**	10,100	15,955
ATTO			
64KB File Read (MB/s)	**502**	200	335
64KB File Write (MB/s)	422	449	**531**
Iometer			
4KB Random Write 32QD (IOPS)	**83,354**	56,087	70,654
PCMark Vantage x64	**71,619**	51,758	52,557
Sony Vegas Pro 9 Write (sec)	485	480	**435**

Best scores are bolded. All tests were run on an Intel Core i5 3470 test bench with 8GB of RAM, an Intel 520 Series SSD, Gigabyte Z77X-UP4 motherboard, and a Cooler Master 450W PSU.

VERDICT 9

Crucial M500 480GB SSD

PUPPIES Fastest drive in its class by a hair; great value.

ARMAGEDDON Bare-bones bundle; 3-year warranty.

$400, www.crucial.com



The IdeaPad Y500's brushed-metal chassis looks quite sleek.

Lenovo IdeaPad Y500

A good idea and a great value

WHAT'S NOT TO like about Lenovo's IdeaPad Y500? Imagine a 2.4GHz Core i7-3630QM CPU notebook armed with two GeForce GT 650Ms, 16GB of RAM, and a 1TB hard drive with a 16GB caching SSD—all for $1,250!

If the impressive specs weren't enough, the Y500 is also quite handsome with its angular accents, rounded corners, and brushed-aluminum finish. It eschews the "extreme" gaming laptop design in favor of a simple and clean aesthetic, but a flaming-red, LED-backlit keyboard adds just enough flare to keep things interesting. Its 15.2x10.2x1.4-inch chassis also makes it much smaller and more portable than our 15.6-inch MSI GT60 zero-point laptop, and the Y500 weighs in at just six pounds, 6.8 ounces. Although it may not be Ultrabook-light, it's lighter than the very-slim Razer Blade gaming laptop (reviewed Holiday 2012), but its much heftier power brick does increase its carry weight by more than a pound.



One unique design feature is the Y500's modular ultrabay underneath the notebook, which allows you to swap in different components. Our unit came with a second 650M GPU, but you can easily unlock this and swap it out with Lenovo's expanded 750GB HDD tray ($190), a DVD burner ($70), or cooling fan ($30). The extra flexibility is appreciated, as it allows you to transform the gaming laptop into a workstation or entertainment system.

You'll be able to enjoy each configuration with the Y500's excellent JBL speakers and sharp 15.6-inch display. Even though the 1920x1080-resolution screen is a TN panel, it offers very good viewing angles all around, and the audio is loud and crisp, partially thanks to Dolby's Home Theatre V4 software. While it can't quite compare to a dedicated 2.1 setup, laptop speakers don't get much better than this.

We also really liked the chiclet keyboard and found the keys to be quiet and responsive. Unfortunately, the trackpad was a big letdown. It supports all of Windows 8 multitouch gestures, like swiping in the Charms bar and pinch-to-zoom, but we often found ourselves triggering these gestures accidentally. We were able to disable these features, which largely fixed the annoyances, but there were still occasions where the trackpad proved unresponsive. In addition, because both click buttons are clunkily integrated beneath the trackpad rather than being separate buttons, we often found ourselves unintentionally sliding the cursor when clicking.

Fortunately, the internal components performed quite well—beyond what we'd expect given the Y500's affordability. This is the first time we've reviewed a laptop with two 650M GPUs in SLI and we're happy to say it had no problems blowing away our zero-point's single GTX 670. In both our STALKER and 3DMark 11 graphics benchmarks, it smoked the zero-point by more than 20 percent. The only issue we experienced was that we had to enable SLI in the Nvidia control panel, as it was disabled by default. The Y500's Core i7-3630QM's 100MHz advantage over the GT60's Core i7-3610QM gave the former a marginal advantage—Lenovo's biggest lead here was 2.5 percent in the multi-thread-hungry x264 benchmark.

In our experiential gameplay tests, the Y500 handled Portal 2 like a piece of cake, as it were, and achieved average frame rates in the 130 range. On the much more graphically formidable Far Cry 3, it achieved a 40fps average at 1080p on the default medium settings, which we consider to be in the realm of playable. But the laptop does falter when it comes to battery life, as it only lasted 163 minutes in our test—24 minutes less than the GT60.

While we're withholding a Kick Ass rating on account of the lackluster battery and frustrating trackpad, those issues can be mitigated if you carry a mouse and charger with you. In general, this is a handsome, portable notebook that can compete in performance with laptops that cost hundreds more. True to its name, the IdeaPad sounds like a great idea to us. –**JIMMY THANG**

BENCHMARKS

	ZERO-POINT	
Stitch.Efx 2.0 (sec)	1,092	1,084
Proshow Producer 5 (sec)	1,786	1,769
x264 HD 5.0	12	12.3
STALKER: CoP (fps)	32.8	40.6
3DMark 11 Perf	2,979	3,624
Battery Life (min)	187	163 (-12.8%)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point notebook is an MSI GT60 with a 2.3GHz Intel Core i7-3610QM, 12GB DDR3/1600, two 500GB Seagate 7,200rpm hard drives, a GeForce GTX 670M, and Windows 8. STALKER: CoP tested at 1920x1080 with Ultra settings, Tessellation, and contact hardening.

VERDICT 9

Lenovo IdeaPad Y500

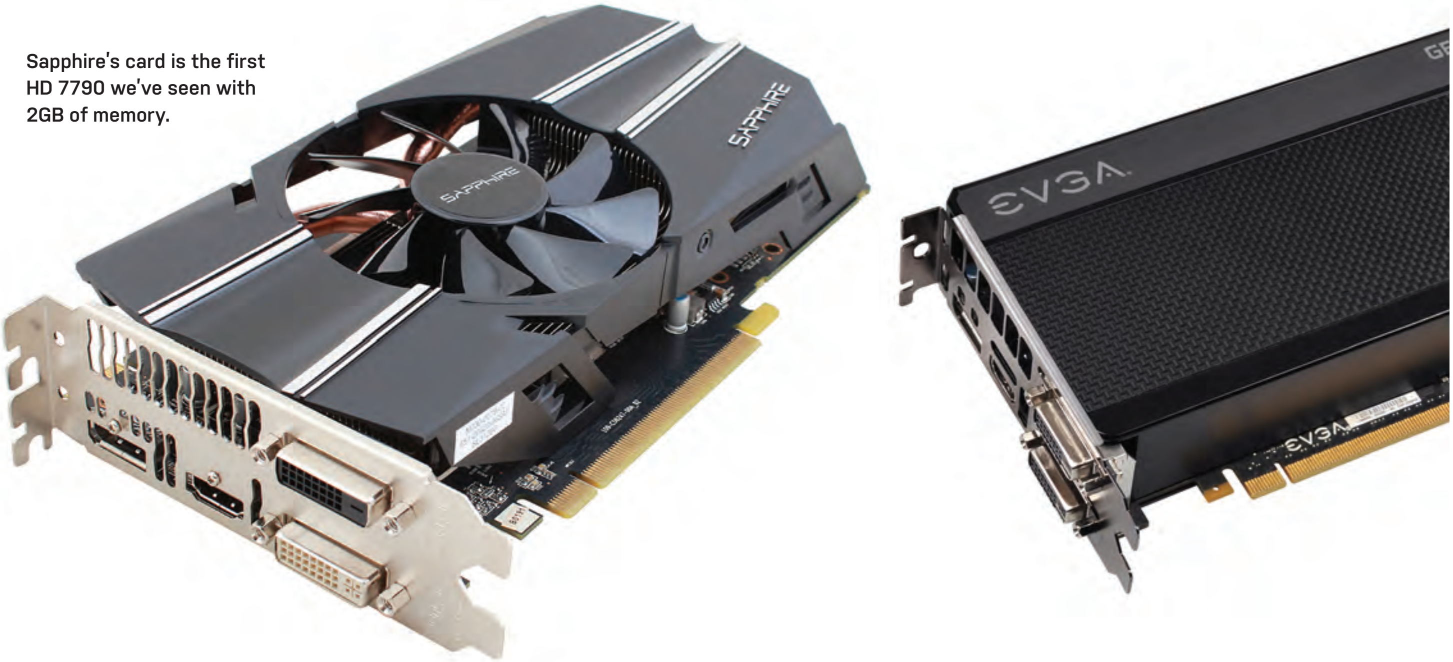
+ GOOD IDEA Two 650Ms in SLI; great specs; amazing price.

– BRAIN FART Poor battery life; mediocre trackpad.

$1,250, www.lenovo.com

SPECIFICATIONS

CPU	2.4GHz Intel Core i7-3630QM
RAM	16GB DDR3/1600
Chipset	Intel HM77
GPU	Two Nvidia GT 650M in SLI
Display	15.6-inch, 1920x1080 TN display (glossy)
Storage	1TB (5,400rpm) HDD, 16GB mSATA SSD
Optical Drive	Not included (optional)
Connectivity	Ethernet, VGA, HDMI, 2x USB 3.0, 1x USB 2.0, audio in, headphone, mic, 1MP webcam, built-in Bluetooth, 802.11n
Lap / Carry	6 lbs, 6.8 oz / 8 lbs, 2 oz



Sapphire's card is the first HD 7790 we've seen with 2GB of memory.

Sweet-Spot Skirmish

AMD's Bonaire takes on Nvidia's Boosted 650 Ti

Last month, AMD announced an all-new GPU dubbed the HD 7790 1GB based on new silicon named "Bonaire" that, at $150, was designed to slot in between its HD 7770 and the more-expensive HD 7850. Not surprisingly, Nvidia then announced a revamped "Boost" version of its GTX 650 Ti, with added support for dual-card SLI, higher clock speeds, and a 2GB frame buffer, countering AMD's effort and shoring up what both companies refer to as the "GPU sweet spot." This month, AMD counterattacks Nvidia's counterattack with a 2GB version of the HD 7790 from Sapphire, leveling the playing field and raising the stakes by including a super-sweet game bundle. Can Nvidia's revamped 650 Ti Boost dominate the midrange GPU field, or is AMD's new silicon the better deal? And how do they measure up to the former champs in this price range? To help settle this feud once and for all, we benchmarked not just the new guys, but all of the cards in this tax bracket. –JOSH NOREM

SAPPHIRE AMD RADEON HD 7790 OC 2GB

When Sapphire called and asked if we were interested in checking out its 2GB version of the recently launched HD 7790, we had just one question: Does a bear benchmark in the woods? We had already sampled a reference design card, and the Asus 1GB version (see benchmark chart), so we were very curious to see what difference an extra 1GB of memory would make in our benchmarks. Since we run all the tests at 1080p, it wouldn't have a chance to shine at higher resolutions; we figured the extra headroom might instead help with antialiasing, but we were wrong, as all cards remained pretty close in scores.

Despite its midrange status, this 7790 card has several high-end features, including a fancy aftermarket cooler (as opposed to the reference cooler), a backplate for increased cooling on the board's caps and VRMs, CrossFire support, and a bundle that includes an HDMI cable, a CrossFire cable, and a copy of BioShock Infinite. This is also the Overclock Edition, so the core clock is goosed 50MHz over stock speeds, and the memory gets a 100MHz nudge, as well. Like other HD 7790 cards, this Bonaire GPU features eight power states (the HD 7970 only uses four) to help it more efficiently use power and remain mostly silent all the time. This card uses much less power than the GTX 650 Ti Boost, which is a bit of a change of fortunes since on the high-end it's Nvidia that has the TDP advantage.

The HD 7790 uses a single 6-pin PCIe connector, takes up two slots like every other video card, and has a semi-low TDP of just 85W. This card's main neutering has taken place on its memory pipeline, which is skinny at 128 bits, whereas the GTX 650 Ti Boost has a 192-bit memory bus. This 7790 features 896 stream processors, has two DVI ports, an HDMI port, and DisplayPort, and support's AMD Eye-Finity multidisplay technology.

In our tests, the Sapphire card performed decently but it faces a few hurdles. First, it's not as fast as the more expensive GTX 650 Ti Boost from EVGA, but the difference is just a handful of frames in all the games we test, with a few notable exceptions. In Battlefield 3 and BioShock Infinite, the GTX 650 Ti had a clear advantage, but in the rest of the tests, it was close enough to call it a wash. We also didn't see any real advantage to having a 2GB frame buffer versus the 1GB when compared to the Asus HD 7790, so while we're certainly not opposed to having more RAM just in case, our tests didn't reveal any measurable difference running tests at 1080p with 4X AA. An even bigger problem for the Sapphire card is the HD 7850, which is an older card but, as our tests show, is clearly faster, by a decent amount across the board, and the HD 7850 is actually less expensive than the Sapphire card, making it a better overall deal when looking at performance alone.

We said last month that we think the HD 7790 is a great card for 1080p gaming, and the Sapphire card doesn't



Nvidia's GTX 650 Ti Boost brings overclocking and SLI to the sub-$200 GPU world.

change that, but it does show you can save money by going with a 1GB version. We also love the fact that this card, and all HD 7790s as of press time, include a free copy of BioShock Infinite, which majorly tilts the advantage to AMD in this price category since performance is so close among cards.

VERDICT 8

Sapphire AMD Radeon HD 7790 OC 2GB

$170, www.sapphiretech.com

EVGA GEFORCE GTX 650 TI BOOST SUPERCLOCKED

EVGA offers four versions of the GTX 650 Ti Boost, so it sent us its Superclocked double-RAM version, which, at $180, costs $30 more than the stock version (at press time there was a $10 rebate, however). This card looks exactly like Nvidia's reference design, so the only changes are internal, in the form of a core overclock of 92MHz and twice the frame buffer at 2GB. Like other "Boost" cards, this GPU features a wider 12-bit memory interface than the standard Ti, which features a 128-bit bus. It sports 768 CUDA cores and a 1,137MHz Boost Clock, which is also a new feature, as the standard Ti didn't overclock at all. The card offers HDMI, DisplayPort, and two DVI outputs, and like all EVGA cards we've tested, includes a bare-bones bundle featuring just a VGA-to-DVI connector and a Molex-to-PCIe adapter. One other new feature of the Boost version of the card that deserves mention is the fact that, in addition to overclocking and higher performance, this version of the card now supports dual-card SLI, which is a first for cards in this price range.

On paper, the GTX 650 Ti Boost certainly looks to be a faster card than the AMD HD 7790 due to its wider memory bus and higher clock speeds, and in the real world of Lab testing, we saw those results laid bare. The Nvidia card is faster, but the AMD card isn't too far behind, and nips at its heels despite having a 55W deficit. The real issue for the GTX 650 Ti Boost is, once again, our little friend the HD 7850 and his $190 buddy the GTX 660. The HD 7850 is faster in some tests and costs less, but the two are very close overall, making it hard to recommend the Nvidia card in that matchup. The GTX 660 is only a smidgen faster despite costing more, so we're inclined to say save your money and get the Boost when comparing those two cards.

Finally, on the software side of things, this card includes a $75 coupon to spend in-game on either Hawken, World of Tanks, or PlanetSide 2. When compared to the inclusion of BioShock Infinite with the AMD card, this offering seems rather weak in comparison, so Nvidia has some catching-up to do. On the hardware side, though, it's clearly the front-runner at around $170 or so, so it's a shame its bundle brings it down.

VERDICT 8

EVGA GeForce GTX 650 Ti Boost Superclocked

$180, www.evga.com

BENCHMARKS

	Sapphire Radeon HD 7790 OC 2GB	EVGA GeForce GTX 650 Ti Boost 2GB	Asus HD 7790 DirectCU II 1GB	XFX Radon HD 7850	Gigabyte GeForce GTX 660 OC
Price	$170	$180	$150	$160	$190
3DMark Fire Strike	3,708	4,132	3,745	4,567	**4,589**
Catzilla (Tiger) Beta	3,727	5,622	3,752	4,908	**6,247**
Unigine Heaven 4.0 (fps)	19	26	20	25	**29**
Hitman Absolution (fps)	27	30	26	**37**	33
Crysis 3 (fps)	15	**21**	12	20	20
Shogun 2 (fps)	43	47	43	52	**54**
Far Cry 3 (fps)	41	47	42	47	**57**
BioShock Infinite (fps)	35	52	36	47	**65**
Tomb Raider (fps)	17	20	14	**22**	20
Battlefield 3 (fps)	31	42	32	**44**	**44**
Core/Memory Clock (MHz)	1,050/6,400	1,072/6,008	1,075/6,400	860/4,800	980/6,000

Best scores are bolded. Our test bed is a 3.33GHz Core i7-3960X Extreme Edition in an Asus P9X79 motherboard with 16GB of DDR3/1600 and a Thermaltake ToughPower 1,050W PSU. The OS is 64-bit Windows 8 Ultimate. All tests are run at 1920x1080 with 4X AA except for 3DMark and Catzilla.



The MS800 features pricey features on a budget.

Zalman MS800 Plus

A budget case that's trying to escape

ZALMAN'S MS800 PLUS aspires to accomplish much for its super-inexpensive price of a cool $100. And on paper, it does.

However, a case is more than just its spec sheet, and the MS800 Plus is a perfect example of a chassis that looks a bit flashier on the printed page than underneath your desk. At its core, the MS800 Plus is a budget case; it suffers the same budget drawbacks you see in a number of cases in this price range, which lessens the impact—or "cool factor"—of the otherwise interesting elements that Zalman adds to the mix.

Popping off the case's side panel (with its larger-than-expected window) is easy enough, thanks to the chassis's thumbscrews. The first fun bit you'll encounter is the case's large "VGA guide," which runs vertically over the top of the motherboard tray for all the case's 21 inches. It's there to support huge GPUs that can stress slots during movement, or it can be used to hold an extra 9.2cm fan (included). Such a feature on a budget case is questionable, though, as overly heavy GPUs tend to cost five to 10 times as much as this case. Nevertheless, you can still install a motherboard without issue.

Tabs located on the front bay covers mar the case's overall aesthetic a bit, but they make installing and removing up to six 5.25-inch devices a complete breeze. We appreciate that Zalman offers twist-lock devices instead of screws for installation, but these locks do feel flimsier than competing push-button mechanisms.

Unique to the MS800 Plus (versus its companion chassis, the plainer MS800) are the case's three hot-swap bays located at its very bottom-front. We love the addition, though we wish we had a wee bit more room for hard drives instead of 5.25-inch devices. In addition to the two 12cm fans, one on top and one in back, a single 9.2cm fan also sucks air in over the HDDs. We'd have preferred a 12cm on the drives, too, but space is already tight with the oddly placed 9.2cm fan. You could always connect the hard drive fan to one of the six available connections on the case's built-in fan controller. It joins the case's two USB 2.0 ports and two USB 3.0 ports, along with audio jacks, on the top of the case's front. Our only complaint is that the controller uses a low-to-high decal to show you where the knob's dial corresponds with fan speeds (as if the noise alone wasn't enough). We would have liked a prettier light or visual indicator much more.

Two elements of the MS800 Plus that leave us a bit concerned are the case's cable management and water-cooling support. The right-most side panel runs perilously close to the rear of the motherboard tray, leaving little recourse for those used to mashing a spider's nest of cables against their side panel. You get a bit of a reprieve near the drive bays, but we wish we had that space all around. Additionally, the case needs a few more cable-routing holes cut closer to the power supply.

As for water cooling, the case comes with rubberized holes for tube routing. However, we could find no way to pop off the case's top panel that didn't make us feel as if we were going to break something important. This mars our dreams of top-mounting a radiator in the chassis.

Zalman's MS800 Plus offers some compelling features—namely, a fan controller and hot-swap bay—at a low cost. But we're not quite sure if some of the funkier elements, such as the out-of-place VGA guide, the case's screw-laden PCI covers, its (practically) bolted-on roof, or its tight cable management, are worth the trade-off. –**DAVE MURPHY**

VERDICT 7

Zalman MS800 Plus

+ CASE RACE Built-in fan controller; hot-swap bays; screwless 5.25-inch device installation; cutout behind CPU cooler on motherboard tray; ample number of preinstalled fans.

− CASE WASTE Unnecessary VGA guide; tight cable routing; drive-bay fan could be bigger; screw-filled PCI brackets; weak aesthetic; how do you get the top panel off?

$100, www.zalman.com

You can control the "i" variant of the H100i from within Windows, using Corsair's free "Link" software.



Corsair H100i CPU Cooler

Quirky, but worth it

ALTHOUGH 280mm radiators and 140mm fans are becoming all the rage in closed-loop coolers, Corsair is showing that we shouldn't count out 240mm rads just yet. The H100i cools admirably, installs relatively easily, and inspires confidence in its longevity. What more can a gearhead ask for?

Well, it was not all wine and roses at first: The pump was pretty noisy. We had to Google around for a solution, then Google some more for a direct link to a firmware update, which we could not find on the H100i's product page. However, the firmware updated quickly (didn't even require a reboot), and the pump's noise went down to a low murmur and stayed there. There was no CD for the "Corsair Link" fan-control software, though, so more Internet foraging was required.

On the bright side, the H100i has one of the easiest installs we've encountered. There is a minimum of widgets to snap together, which lowers the frustration level (and saves you from having to scour your carpet when you drop something tiny). You put a bracket underneath the motherboard, hold it there with a few provided screws, and lower the heatsink onto the screws, which connect to another bracket that you slapped onto the heatsink. Then, secure the heatsink bracket to the motherboard bracket with another set of screws. And if you're using an LGA2011 motherboard, you don't even use the first bracket. Even a caveman could do it! The cooler is intelligent, with similar functionality to the Kick Ass award–winning H80i we reviewed in our March issue.

We recently switched our CPU-cooling test-bed case from a Thermaltake Level 10 GT to a spacious Corsair 900D, by the way, so our performance here can't be directly compared to previous results (read this month's Lab Notes for more info on the switch). How do you judge the H100i, then? Well, we also installed the ever-popular Cooler Master Hyper 212 Evo air cooler for comparison. With our Core i7-3960X running overclocked to a little over 4.1GHz on all cores, the H100i performed better on Quiet mode than the 212 Evo did on Performance. That's pretty excellent cooling prowess—and you could add two more fans to the radiator (provided they fit in your case).

That helps excuse the fact that the H100i creates nearly intolerable noise when set to Performance mode, since it looks like you won't *need* to run the fans that hard most of the time, as long as your case has good airflow. We should note, however, that the pump requires a SATA power connection. Not a deal-breaker, but neat-freaks might have trouble threading this cable that close to their CPU and still keeping everything tidy. You'll probably want to use an extension cable or give the pump its own line since the distance between the CPU and most drive cages is usually too great to use a single cable for both locations.

Despite its quirks, though, the H100i is a highly respectable piece of gear. The firmware and cabling issues are not difficult or tedious to resolve, and the build quality is worthy of a 5-year warranty (the longest of any brand of closed-loop liquid cooler). –TOM MCNAMARA

VERDICT 9

Corsair H100i CPU Cooler

+ T-SHIRT + JEANS Easy installation; excellent cooling; 5-year warranty.

− SOCKS + SANDALS Can get noisy; needs firmware update; cabling caveat.

$110 (street), www.corsair.com

SPECIFICATIONS

	H100i Quiet Mode	H100i Performance Mode	212 Evo Quiet Mode	212 Evo Performance Mode
Ambient Air	20.3	20.5	20.0	20.0
Idle Temperature	30.7	**29.3**	35.5	30.5
Load Temperature	67.1	**61.0**	70.0	67.3
Load - Ambient	46.8	**40.5**	50.0	47.3

All temperatures in degrees Celsius. Best scores are bolded. All tests performed with an Intel Core i7-3960X at 4.1GHz, on an Asus Rampage IV Extreme motherboard, in a Corsair 900D with stock fans set to Standard.

SPECIFICATIONS

Radiator Dimensions (H x D x W)	1.06 x 10.8 x 4.7 inches
Weight	2.3 lbs
Stock Fans	1x 12cm PWM
Socket Support	LGA1155/1156/1366/2011; AM2/AM2+/AM3/AM3+/FM1/FM2
Additional Fan Support	1x 12cm (screws included)



The 5600U's keyboard and mouse match the AiO's slick, glassy aesthetic.

Acer Aspire 5600U

Trades thin figure for performance



THE ACER ASPIRE 5600U is a slim and somewhat-sexy all-in-one. It features a 1.3-inch-thin chassis and a 23-inch display atop a clear-plastic base, giving the illusion that it's floating in air. Once you get past the aesthetics, however, you'll find that the 5600U is lacking where it counts.

Keeping the AiO upright is an adjustable kickstand that allows it to tilt 30 to 80 degrees, which is limber enough to use sitting or standing. Alternately, a slide-in VESA mount makes it possible to attach the 5600U to an arm or wall. While it doesn't feature a keyboard docking area like our Asus ET2300 zero-point, you can tuck the peripherals behind the display, in between its frame and the AiO's stand. All in all, the 5600U doesn't take up much space, with a desktop footprint of just 8x22.5 inches.

Another nice feature of the AiO is its 1920x1080-resolution monitor. While it's a TN panel, it offers much better viewing angles than the HP Envy 23 we reviewed last month, though it has a similarly glossy screen that's far too reflective for our tastes; the panel supports 10-point touch. While attractive, the thin profile doesn't do wonders for audio, as the top-mounted speakers themselves sounded thin and project the audio toward the ceiling as opposed to at us.

In terms of ports, the left side of the AiO features two USB 3.0 ports, an SD card reader, and a mic/speaker-in. The right side has the power button, DVD drive, and monitor controls. On the back of the AiO there are three USB 2.0 ports, an Ethernet port, S/PDIF port, and two HDMI ports for in/out options.

The transparent aesthetic of the included wireless mouse and keyboard is cool-looking and matches the 5600U, but in use we were unimpressed with the peripherals' plasticky feel. This is especially true of the mouse, which is made of a low-quality, toy-like plastic. The compact keyboard feels slightly better, but oddly omits lights of any kind, such as a Caps Lock indicator.

While the AiO makes a nice first impression, once you get past its looks, you become aware of its deficiencies under the hood, even at the relatively affordable price of $1,000. It comes with a dual-core 3.2GHz Core i5-3230M that can Turbo up to 3.2GHz, 6GB of DDR3/1333, and—while large—a 1TB drive that spins at 5,400rpm. We wish it came with an SSD or at least a caching drive, but its biggest omission is a discrete video card.

It's no surprise, given its specs, that it got creamed in our benchmarks. The Acer's best showing was a 15 percent lag behind our zero-point's quad-core 3GHz Core i5-3330M in ProShow Producer. You can thank the 5600U's Hyper-Threading for that close showing. In the multithreaded TechARP x264 HD test, however, it got bullied by 40 percent. The integrated graphics got stomped by 45 percent in Metro 2033. Our zero-point's GPU is but a GeForce 630M, too, so integrated graphics still have a long way to go in competing with even the humblest video cards.

Firing up the less stressful Portal 2, the 5600U was capable of just 15fps at 1080p on max settings. We were able to hit the 60fps range by disabling AA and setting everything to medium, so it's playable if you don't mind image quality taking a hit. In terms of boot times, the 5600U started up in 24 seconds, which is typical given its specs.

The Aspire 5600U is low-cost, but in more ways than one. While it might work as a decent touchscreen AiO for your parents, it most certainly doesn't have the chops for a power user. If you're looking for something that lives up to the "all-in-one" moniker, we recommend spending $300 more for the Asus ET2300, which features much better specs all around. **–JIMMY THANG**

VERDICT 6

Acer Aspire 5600U

+ GOOD LOOKS Affordable price tag; thin; unique aesthetic.

– LAME PERSONALITY Weak performance all-around; lackluster specs; no discrete graphics.

$1,000, www.acer.com

BENCHMARKS

	ZERO-POINT	
Stitch.Efx 2.0 (sec)	1,192	1,486 (-19.8%)
ProShow Producer 5 (sec)	1,841	2,181 (-15.6%)
x264 HD 5.0	9.9	5.9 (-40.4%)
Metro 2033 (fps)	22	11.9 (-45.9%)
3DMark 11 Perf	1,333	631 (-52.7%)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point all-in-one PC is an Asus ET2300 with a 3.0GHz Intel Core i5-3330M, 8GB DDR3/1600, 1TB 7,200rpm hard drive, a GeForce GT 630M, and Windows 8. Metro tested at 1280x768 with Medium settings, Tessellation enabled.

SPECIFICATIONS

CPU	2.6GHz Intel Core i5-3230M
GPU	Intel HD 4000
RAM	6GB DDR3/1333
Storage	1TB (5,400rpm) HDD
Optical	DVD burner
Display	23-inch TN LCD 1920x1080 (10-point touchscreen)

The M500 is the first SSD to offer a relatively affordable 1TB option. Who needs kidneys, anyway?



Crucial M500 480GB SSD

A winning package of low price and high performance

THE CRUCIAL M500 is the company's third-generation 6Gb/s SSD, and the successor to the often-praised M4 SSD, which we named the "Best Bang for your Buck" SSD back in December 2012 due to its well-rounded package of decent performance at a great price. In our estimation, the new drive follows suit, though with much-improved write speeds and massively increased capacities at lower prices, thanks to its move to smaller-process NAND flash. Not only does it come in the standard 120GB, 240GB, and the 480GB version you see before you, but it's also offered in a pants-tightening 1TB version at just $600, making it the only truly affordable 1TB SSD ever offered. Since the terabyte drive was not available at press time, we're taking a look at the 480GB version, which sports the exact same specs as its big brother.

The drive itself comes in a shiny 7mm silver enclosure, so it fits into some thinner notebooks. A 9.5mm spacer is included, but not a 3.5-inch adapter, nor is there any software in the box or online aside from a firmware updating tool, which is disappointing. Inside the M500's shell we find that Crucial has moved from 25nm NAND to 20nm MLC NAND flash. Smaller-process NAND offers benefits such as lower power consumption and increased capacities, but also reduces the NAND's life span somewhat. Still, Crucial offers the drive with a 3-year warranty and says the drive can handle 40GB of data written to it every day for five years, so the drive's NAND should last long enough even for hardcore data-mongers. Crucial is still using a Marvell controller, though it's an updated version of the one used on the M4, and, of course, it has updated firmware.

In testing, we saw the M500 post very respectable scores across the board, though none were the fastest we've seen, nor would we expect them to be at this price. The biggest improvement we see over the M4 is in write speeds, which have gone from 193MB/s in CrystalDiskMark to 422MB/s, and that difference shows in the AS SSD compressed-data test as well, showing almost a doubling of speed from the M500. The ATTO test mirrors our other results, showing the drive capable of around 500MB/s read speeds and 422MB/s write speeds, which is superb for a "value" drive. Its Iometer score of 83,354 IOPS is also top-of-its-class as well, as is its PC-Mark Vantage HDD test score of 71,619. Oddly, its Sony Vegas score is unchanged from the M4, so it's possible the Marvell controller still has a tough time with data-compression duties when writing huge files, 20GB in our scenario.

Overall, the M500 shows just how far value drives have progressed, since this drive is about as fast as the fastest SSDs available a year ago. When compared to its most direct competitor—the Samsung 840 500GB—the two are pretty evenly matched, though the Crucial drive was a little faster in more tests. However, the Samsung drive costs about $40 less, has the same warranty, and better software support, making it a nail-biter between them. –JOSH NOREM

BENCHMARKS

	Crucial M500	Crucial M4	Samsung 840
Controller	Marvell 9187	Marvell 9174	MDX
Capacity	480GB	256GB	500GB
CrystalDiskMark			
Avg. Sustained Read (MB/s)	480	**500**	464
Avg. Sustained Write (MB/s)	**422**	193	333
AS SSD			
4KB Read (IOPS)	6,388	6,741	**6,921**
4KB Write (IOPS)	**17,003**	10,100	15,955
ATTO			
64KB File Read (MB/s)	**502**	200	335
64KB File Write (MB/s)	422	449	**531**
Iometer			
4KB Random Write 32QD (IOPS)	**83,354**	56,087	70,654
PCMark Vantage x64	**71,619**	51,758	52,557
Sony Vegas Pro 9 Write (sec)	485	480	**435**

Best scores are bolded. All tests were run on an Intel Core i5 3470 test bench with 8GB of RAM, an Intel 520 Series SSD, Gigabyte Z77X-UP4 motherboard, and a Cooler Master 450W PSU.

VERDICT **9**

Crucial M500 480GB SSD

PUPPIES Fastest drive in its class by a hair; great value.

ARMAGEDDON Bare-bones bundle; 3-year warranty.

$400, www.crucial.com



Seagate's drive is surprisingly affordable, but only includes a 2-year warranty.

Seagate Desktop HDD.15 4TB

Finally, a 1TB-per-platter hard drive

FOR OVER A year now, we've been asking for just three things in a desktop hard drive: 7,200rpm speed, 4TB capacity, and 1TB per platter. That's all we've asked for, and we don't think we're being unreasonable, since all we want is the maximum amount of space and performance in a disk drive.

Regardless, first we got 4TB, but at 5,400rpm in a five-platter design from Hitachi. Then we got 4TB, also in five platters, but at 7,200rpm from both Hitachi and WD. "Nice," we thought, "progress!" So when we heard Seagate was finally wading into the 4TB waters, we figured this would be the drive we have all been waiting for—4TB, 1TB per platter, and 7,200rpm.

Unfortunately, our prophecy remains unfulfilled, as the Seagate drive, dubbed plainly "Desktop HDD.15" is certainly 4TB, and it uses 1TB per platter for improved transfer speeds, thanks to higher platter density, but its spindle only rotates at a lowly 5,900rpm. The upside of this slower rotational speed is the extra-dense platters help it actually perform like a 7,200rpm hard drive, all while remaining quiet, running cool, and actually being affordable, too. All these qualities combine to make this new Seagate drive the best 4TB disk drive we've tested yet.

As stated previously, this is the first hard drive available that uses four 1TB platters, which gives it a speed advantage over its five-platter rivals from WD and Hitachi. Since there is more data on each platter, the read/write heads don't have to move as much to collect data, and when they are in motion over the platters, they can hover over more data, as well, which increases transfer rates. As to why it's just 5,900rpm, Seagate recently announced it was abandoning 7,200rpm 2.5-inch hard drives in order to focus on both SSD and hybrid SSD drives. We assume Seagate is thinking along similar lines when it comes to desktop hard drives, focusing on SSD for speed and HDD for capacity and price-sensitive needs.

In testing, we saw Seagate's 4TB drive post average sequential read speeds that were equivalent to 7,200rpm drives like the WD Black and Hitachi 7K4000, which is a significant accomplishment, but the 4TB drive was also slower than the Barracuda 3TB. As expected, its access times hovered in the 17ms region, which is totally normal and makes this drive a pokey one for OS usage, but we doubt anyone would do such a thing. Its average write speeds were slower than the WD Black, but it's in the neighborhood of the other 7,200rpm drives, so it gets some kudos for punching above its weight class. In our simulated "real-world" test of PCMark Vantage, the Seagate scored below even other 5,400rpm drives, which is a bit curious but reinforces this drive's role as a storage volume instead of an OS device.

The good news here is if you're just looking for 4TB of storage for the least amount of money, this is the drive you want. Its asking price of $190 is righteous when compared to $300 for the 7,200rpm WD Black 4TB and $380 for the 7,200rpm Hitachi 7K4000.

The bad news is this drive includes a meager 2-year warranty, which is the lowest we've seen on a desktop drive but on par with other "budget" drives. In the end, this is a fast drive at a great price, making it easy to recommend. –JOSH NOREM

BENCHMARKS

	Seagate 4TB	WD 4TB Black	WD 4TB RE	Hitachi 4TB 7K4000	Hitachi Deskstar 5K4000	Seagate Barracuda 3TB
HDTune 4						
Avg. Read (MB/s)	133	127.9	132.8	132.7	108.3	**155.8**
Random-Access Read (ms)	17.2	13.6	**12.5**	15.9	19.9	14.9
Burst Read (MB/s)	236.3	213.2	275.5	307.9	**378.3**	325.7
Avg. Write (MB/s)	128.5	**155**	131.9	131.1	105.6	150.7
Random-Access Write (ms)	17.3	13.2	**12.5**	15.9	18.5	14.9
Burst Write (MB/s)	202	**336.2**	291.6	317.3	335	335.5
PCMark Vantage	4,491	6,196	6,664	6,125	6,135	**6,766**

Best scores are bolded. All tests conducted on our hard-drive test bench, which consists of a Gigabyte Z77X-UP4 motherboard, Intel Core i5-3470 3.2GHz CPU, 8GB of RAM, Intel 520 Series SSD, and a Cooler Master 450W power supply.

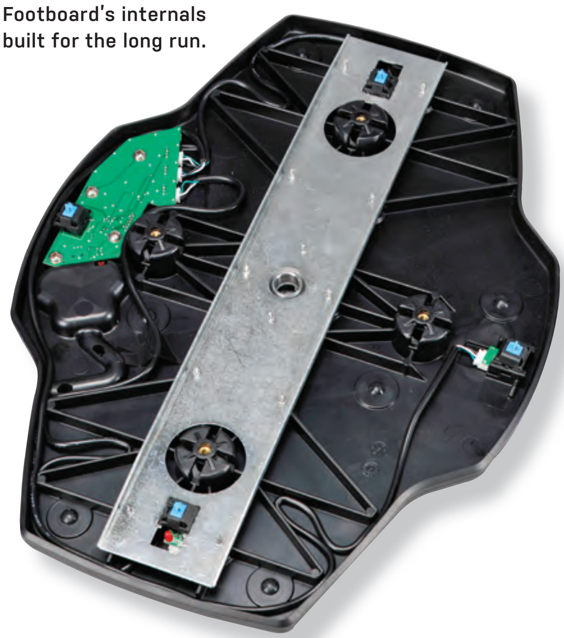
VERDICT 8

Seagate HDD.15 4TB

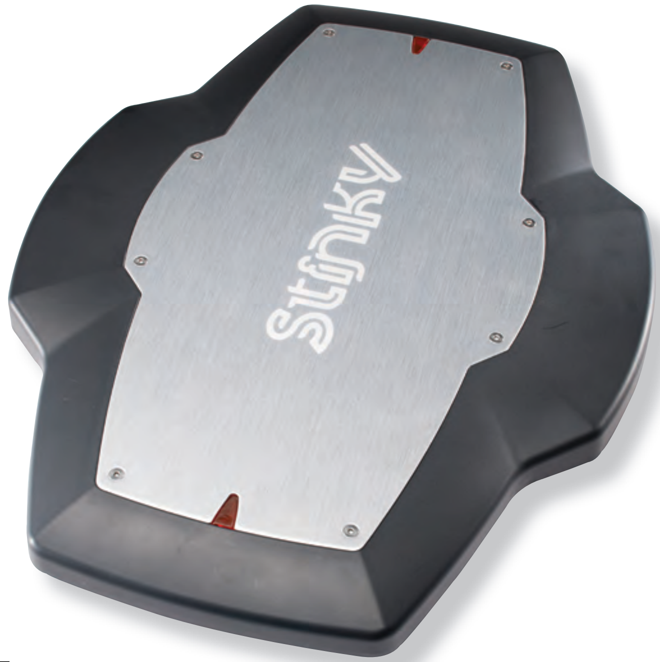
+ **SSD** 1TB per platter; fast and quiet; very affordable.

− **HDD** 5,900rpm; 2-year warranty.

$190, www.seagate.com



The Footboard's internals are built for the long run.



At least it's not called the Cyber Athlete's Foot.

Stinky Footboard

Let your foot give you a hand

THE PREMISE of the Stinky Footboard is simple: Sometimes two hands and 10 fingers aren't enough. And in games that require you to press more keys than a world-class pianist, your foot can come in handy.

That's the idea behind Stinky's deadly simple Footboard. The USB device is akin to a four-way, foot-operated D-pad. We had concerns about the durability of the Footboard, but cracking open our review model revealed the D-pad balanced on a heavy-duty ball-bearing and a metal bar running across the length of it. The switches themselves are Cherry MX blue. The unit connects to the USB cable via a standard Micro-USB port, so you can swap cables if need be. Four independent springs can be swapped out to change the spring rate from a selection of soft, medium, and hard. Though sturdy, we have to note that our early unit did fail and would no longer be recognized by any system, despite cable swaps. We finished our review with a second unit borrowed from another magazine.

Setting up the Footboard is quick, after you've downloaded the app. The Footboard app lets users create keybindings—or should we say foot bindings—for each of the controller's four switches (up, down, left, and right) and install firmware updates. The app works fairly well, but we couldn't bind more than one key to a direction. For example, we wanted to bind one switch to let us run in Battlefield 3—Shift + W—but the Footboard wouldn't record the macro. It was either W *or* Shift, but not both. It's too bad because such a feature would take the finger stress out of those long runs across a map.

Battlefield 3 wasn't the only game we used the Footboard in. We also ran it through Dishonored and Sleeping Dogs, among other games, but we admit we found it most useful for BF3, where it aided movement and crouching. And when running, it really relieved us of the pinky stress that results from having to curl back and hit Ctrl all the time to duck.

Unfortunately for the Stinky, there are some styles of games that just don't work very well with the device. When we tried using the Stinky in Dishonored, we found it wasn't very helpful. Dishonored is a slow, stealthy game that focuses on using just the WASD keys and mouse, so we couldn't find much use for the Footboard, as the game doesn't rely much on running. We tried to map the Footboard to the WASD keys but it was just awkward. We also couldn't use the Stinky for strafing since we couldn't bind more than one key.

Another game that didn't play very well with the Stinky was StarCraft II. The mouse and keyboard were just too good and we abandoned using the Footboard halfway through. Again, the Footboard seemed cumbersome in this scenario and our keybindings felt very forced and unneeded, as a traditional keyboard setup was easier for us. There are obviously games where the Stinky works—such as a tactical shooter, where you might bind the left and right directions for lean out (who can ever remember those commands?) but it's not the universal salve we thought it might be.

The Stinky has a good build quality and easy-to-use software, which makes it a reliable gaming accessory. What we're not fans of is the Footboard's premium price: $120. Probably the only way to tell if your gaming style will benefit from the Footboard is if you sometimes wish you had an extra hand—or foot—during sessions. –**CHRIS ZELE**

VERDICT 7

Stinky Footboard

+ RESIDENT EVIL 4 Easy-to-use software; great build quality; FPS-friendly.

– RESIDENT EVIL 6 Pricey; limited usability; no macro support.

$120, www.stinkyboard.com



The visuals within BioShock Infinite can be awe-inspiring.

BioShock Infinite

Would you kindly play this game?

HOW DO YOU critique a dream? It's the problem we face in reviewing Irrational Games's BioShock Infinite, a game that straddles the gap between an adventure title and a first-person shooter.

That's not a reflection of its overt design—BioShock Infinite is, at its core, a title that will leave those with less-developed keyboard and mouse skills a bit sad. Rather, the flawlessness of the game's storytelling and general structure *compels* a player to want to explore, not shoot.

BioShock Infinite, once you beat it—and kudos to you for making it through the game's final challenge, which is a bit of an unexpected kick in the pants to its difficulty level—just makes *sense*. The game's big reveal helps to write away some of the frustrations you might feel when pushing your way toward the conclusion, ever driven by BioShock Infinite's exceedingly complicated storyline and wonderfully drafted protagonists.

We had hoped for a title that eschews raw gunslinging for role-playing, one that allows a player more choice and flexibility in gameplay—sadly, this is not it. Instead, BioShock Infinite offers a fairly linear progression that feels like a step back of sorts from the game's predecessors.

BioShock Infinite is the truest journey into the unknown, accentuated by flashbacks and other plot devices that give the story a perfect, full-circle narrative (no spoilers). You'll be confused. You might even be bored at times—thanks to those action elements that, quite frankly, are hardly as compelling as your character's stumbles through a world that doesn't make sense, won't make sense, and makes less sense the more you uncover its secrets. In its third BioShock offering, Irrational has perfected the art of, well, being BioShock, which requires mastering a tricky balance of aloofness, storytelling, and just plain weird that you don't often see quite as brilliantly mixed in other similarly "odd" titles.

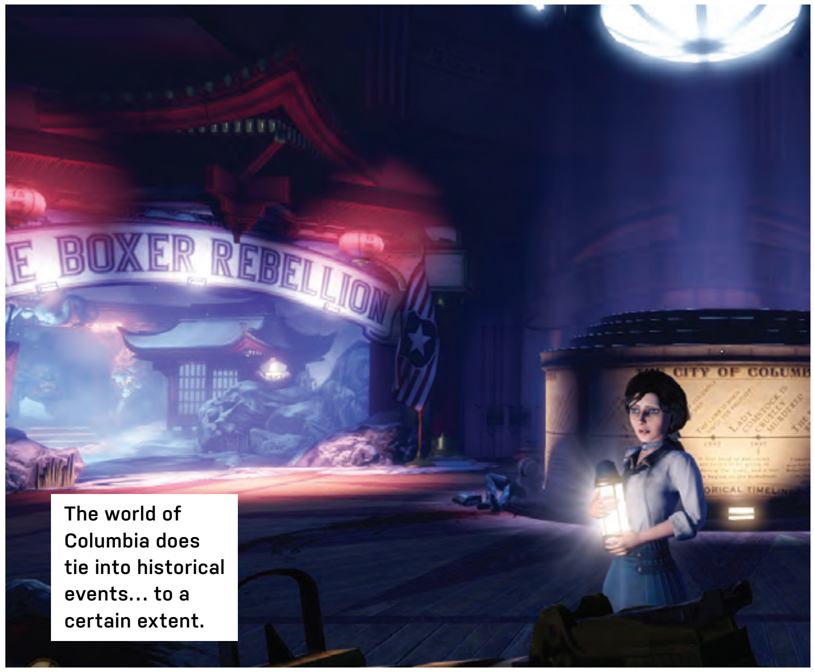
We're loathe to discuss the plot of BioShock Infinite to our usual detailed degree due to the transformative experience that Irrational builds during your trip through the 1912 world of Columbia—truly, a city in the clouds. In many ways, the game's plot is what you make of it; blast your way through with reckless abandon and you'll lose some of the flavorful storytelling elements that require a bit more sleuthing to uncover. And God help you when it comes time to parse the game's overall plot during its big conclusion—you'll get a nosebleed.

What we *can* say is this: You're tasked with tracking down a girl, Elizabeth. This quest pushes you through all the oddities of an Andrew Ryan–like totalitarianism—based on religious zealotry this time around, not capitalism—throws in the age-old plot device of forcing your character, Booker DeWitt, to run the gauntlet between two warring factions, and then just gets plain strange.

The strange parts offer up some of the game's most intellectually stimulating moments, assuming that they don't com-



A giant George Washington robot carrying a huge gun is something we wouldn't want to piss off.



The world of Columbia does tie into historical events... to a certain extent.

pletely turn you away from finishing the title outright. They could. You'll wonder why '70s rock music and other "modern" songs coexist in the same realm where you're shooting up giant robotic Abraham Lincolns and blasting them with wicked powers from your glowing left hand.

We're not huge fans of the game's combat elements, precisely because they aren't really all that difficult, nor do they offer a great deal of variety or interest. Your guns are fun, but relatively standard—pistols, machine guns, burst-fire machine guns, sniper rifles, etc. They're upgradable to a small extent via purchasable elements from the litany of terminals scattered throughout the game, which present a fun challenge in itself: You have limited resources to upgrade. Unless you frequently spend big on ammunition, you'll find yourself frequently switching between whatever guns you happen to be able to pick up. Which is to say, don't bank on always having a favorite at your disposal during an extended firefight.

Your left-hand "Vigor" powers—an icon of the BioShock universe—are a bit more varied. You can zap, firebomb, push, and even turn enemies to your side (they kill themselves when they're finished fighting for you, one of the game's first "oh, wow" moments). These, too, can be upgraded, but at a significantly greater cost than your guns. You can also string your powers together to form some unique and painful combinations, but this is definitely one of BioShock Infinite's less-advertised bits. (We hope you saved your Salts.)

The game's baddies are decently intelligent, but BioShock Infinite is a bit fonder of throwing legions of pain at you and forcing you to come up with fun ways to kill them without turning to fisticuffs (which, we note, is still fun). You do get some strategic elements to play with around midway through the game, thanks to your travelling companion, Elizabeth—as to how, we won't spoil. However, these bits make some fights almost *too* easy, though we do appreciate being able to summon friendly, chaingun-carrying robots to hang out with us.

And then there's Elizabeth. Irrational has polished the nuances of your travelling companion to such a degree that you might actually find yourself emotionally struck by the various twists and turns you two take throughout your journey(s) in Columbia and beyond. Not since Valve's GLaDOS have we felt that a developer perfectly nailed a character's presentation in such a compelling, captivating fashion.

This is helped in part by the game's mechanics—specifically, its help-you system, which has Elizabeth tossing you items whenever you seem to need them most. Not only does she save your gaming butt, the experience further cements the unique bond that Irrational often evokes between your character and hers. She's not just a combat droid along for the ride; she's humanity in digital form.

If you don't believe us, go hunting around for a guitar within the game; the single scene of Elizabeth singing Columbia's "theme," as it were, is easily one of the more poignant (albeit subtle) moments we've experienced in a first-person shooter. Heck, she'll even warm her hands on a fireplace when you enter a room that has one—it's subtle, but critical believability.

BioShock Infinite's pacing and "learnability" is ideal; its complexity is vast yet subtle, precisely based on how deep you're willing to try new tactics and features as you play. Its characterization and environments are as beautiful as its dystopian setting is disturbing and, at times, racist. You owe it to yourself to play this game all the way through, if for nothing else than the hours you'll spend debating its merits (if not its ending) with your gamer friends. The world of BioShock doesn't get much better than this. –**DAVE MURPHY**

VERDICT 9 KICK ASS!

BioShock Infinite

+ A MAN CHOOSES Excellent pacing; wonderful character development; a story you'll spend hours talking about; barbershop quartet.

− A SLAVE OBEYS Combat can feel a bit uninspired if not downright easy (save for the game's final mission); a more linear story progression than previous BioShock titles.

$60, www.bioshockinfinite.com, ESRB: M

LAB NOTES

TOM MCNAMARA **ASSOCIATE EDITOR**



A Case of the Vapors

Our CPU-cooler zero-point system gets an upgrade



WE WERE GETTING ready to evaluate a closed-loop liquid cooler this month when we encountered a small problem: Its 280mm radiator wouldn't fit in our case. Our test bed, a venerable and battle-scarred Thermaltake Level 10 GT, does not have any spots for the jumbo rads that are all the rage with the kids these days. We could have drilled new holes, but we want to approximate a real-world setup as much as possible. Coincidentally, we had a freshly minted Corsair 900D lurking in the shadows, biding its time. Since it will fit cooling devices the size of a mini-fridge, we felt it was up to the task. The next step is to yoke some oxen to it, so we can actually move the thing. Failing that, we can always strap it to an intern. Gordon appears eager to try out his new cattle prod either way.



Gordon Mah Ung
Deputy Editor

The box waiting to replace my wife's PC has been sitting for so long, I had to upgrade it once already. My reluctance? The 700GB of data and apps that need to be migrated from her Core 2 Quad box, and the time window to do it. I will have to do it soon, as I recently heard her slamming on the keyboard, yelling, "This PC is too slow!"



Jimmy Thang
Online Managing Editor

I've never been a drug addict or alcoholic, but I find myself suffering from withdrawal symptoms: touch withdrawal symptoms. Having used a variety of Windows 8 tablets and AiOs over the past couple of months, whenever I use a PC without a touchscreen, I still often reach out and swipe at the monitor in vain.

Hi. My name is Jimmy, and I'm a touchaholic.



Chris Zele
Executive Intern

I decided to upgrade to Windows 8 on my desktop at home and I have to say, it's not all that bad. Just like Jimmy, I installed the free Classic Shell start button so I don't have to deal with Modern UI. If Microsoft didn't force the lame touch interface onto desktop users, I'm sure Windows 8 would have done much better.



Josh Norem
Senior Editor

I spent the month buried in GPUs, first the better-late-than-never AMD Radeon HD 7990, then the $150 GPUs from Nvidia and AMD. The competition between AMD and Nvidia right now is intense, as AMD seems to have woken from a slumber and is punching back at Nvidia with everything it's got, including epic game bundles that Nvidia can't seem to touch.

LETTERS

WE TACKLE TOUGH READER QUESTIONS ON...

> Brand Rage
> Weighing PhysX
> Game Theory

Learning to Trust Again

In the last couple of years, I've tended to stick to brands I know, but occasionally I venture out to try a new brand. I won't mention the names, but they're major gaming equipment manufacturers. I've had severely negative product experiences even though reviews on Newegg might glow about the products.

How do you guys get over negative brand experiences and start to trust a manufacturer again? Dejected in Boston.

—TS

DEPUTY EDITOR GORDON MAH UNG RESPONDS: I tend to practice brand loyalty and brand rage depending on how badly I've been screwed over. If it's just one bad experience, I'd probably chalk it up to an anomaly. If it's two, it makes me want to hyper-research anything I might buy from the company first.

What can really make a brand dead to me is how the company responds to a complaint. If I get a product that's bad and then when I go to the company to rectify it they kick me in the nads and push me down the stairs and then charge me for it, I won't buy from that company again until the sun goes black. I wouldn't care if I was on fire and the company made the only water on the planet. So, frankly, I think it's perfectly fine to never buy from a company again, depending on how badly you've been burned.

Is Physx Worth It?

Is Nvidia's PhysX technology (or AMD Radeon's lack thereof) enough of a reason to always choose an Nvidia card if you're a gamer? I've bought Nvidia cards all my life, but I know Radeon cards are high-performers as well, yet for years I've had this subconscious, "Yeah, but" nagging me about losing PhysX if I switched brands. If performance were close enough to equal between the two, is not having PhysX a legitimate deal-breaker?

—Ian O'Regan

SENIOR EDITOR JOSH NOREM RESPONDS: We went to the Nvidia website to find its description of PhysX, which we've copied and pasted here. Pay attention to the blockbuster titles it lists: "PhysX taps into the GPU for complex physics calculations. Used by popular games such as Alice: Madness Returns, PhysX brings games to life with dynamic destructi"—yes, that's how it ends. So, not only does it list a single game that nobody plays, but it's on a page that nobody is tending to, apparently. (See for yourself at http://bit.ly/JAtJJx.) That said, we loved the PhysX in Borderlands 2, but that's the only title that springs to mind when we think "awesome PhysX," so we would not call it must-have technology. Then again, neither is the Tress FX used for Lara Croft's hair in Tomb Raider, so buy what you like and don't count on PhysX being something you'll pay attention to in every game.

Game Theory Debated

As of the past three or four issues of *Maximum PC*, I have become increasingly unhappy with the Game Theory column, to the point where I feel it's time to say something about Mr. McDonald. His reviews have been increasingly negative and non-objective, and with his latest review on BioShock Infinite he has completely "jumped the shark," if you will. At the end of the game—after having watched the final scene after the credits, which Mr. McDonald must not have seen, as *that* was the happy ending he was bitter about not having—my son (21) and I (40) were discussing what it all meant for over half an hour, making sense of it all and clicking the pieces together. He should be ashamed to make the statement that, "...Infinite mocks Christian notions of forgiveness and redemption...." The main character was in an *infinite loop!!*

Game Theory was always my "go-to" column, but if he can't afford to take the time to comprehend what he's playing, I can no longer trust his opinions and may as well no longer bother with it. Nothing pleases Mr.McDonald anymore—he always has something nasty to say, every hug comes with a stab in the back.

—Richard Mislivets

GAME THEORY COLUMNIST TOM MCDONALD RESPONDS: I did see the post-credit sequence. First, don't bury a key narrative element after an interminably long credit sequence. That's for little bonuses like you see in the Marvel films, not main plot

↘ submit your questions to: comments@maximumpc.com

> WHAT CAN REALLY MAKE A BRAND DEAD TO ME IS HOW THE COMPANY RESPONDS TO A COMPLAINT

points. Second, I would deny that the post-credit bit was anything more than a cutesy-clever fillip to set up DLC. Third, I hardly see how the infinite loop theme improves the idea that you're either unforgiven and a miserable bastard, or forgiven and megalomaniacal monster.

I was quite fulsome in my praise of BioShock Infinite, but I think that compared to the real moral decision-making and dramatic unity of the original, there were disappointments in the sequel. I'm doing BSI the courtesy of treating it as a rich text, worthy of analysis. If you think it's a good ending, great! That doesn't invalidate my reading. I was appalled by the baptismal scene, but there's room for differences of opinion. That's a sign of a great creative work: People can argue about its meaning and relative worth.

AMD Build BS

I recently read your "Ultimate AMD Gaming Rig" article (Build It, January 2013), and the thing that stood out to me was the cost disparity between it and the rig you were putting this thing up against. I figured out that your zero-point rig, mainboard, processor, RAM, and GPU would run me $1911.47 on Newegg.com. The same parts on the AMD build cost a total of $965. Let me write that again: $1,911.47 vs. $965. Sure, you guys threw AMD a bone in the last two sentences, and yeah, you can say, man, those Intel parts are fast. But you can also say that with AMD you get 60 percent of the performance for 50 percent of the cost. I understand that you bench all systems against your zero-point rig, but you're also comparing a cheetah to my house cat.

—Jeremy Steiger

CAT-COMPARISON EDITOR JOSH NOREM RESPONDS: You are right, Jeremy; the AMD machine cost half what the zero-point system costs, so the matchup wasn't fair. When we built that machine, we were pure of heart and just wanted to make a totally kick-ass AMD machine with a cool color scheme. Once we had built it, we sort of looked around the Lab and thought, "What can we compare it to?" In the past, we had compared all systems to the zero-point, and though we knew it wasn't exactly fair at the time, it was our "established baseline" for system performance. However, we see your point, so we've decided that in the future we will only compare comparable systems to the zero-point. For Build It, we'll try to compare the rigs to similar systems we've created, or we'll just tell you what the benchmark scores are if there's not a sensible competitor. We also like your idea of comparing various cat breeds against one another; let us talk to our sister magazine *CatLife* about some different story angles.

[NOW ONLINE]

VIRUS PROTECTION GUIDE

Whether you've contracted a virus (of the Internet variety) or just want to protect your PC from a future malware attack, our in-depth virus-protection guide has you covered. We provide tips on how to spot shady links, share our favorite antivirus software recommendations, and explain how to guard your PC against nasties. http://bit.ly/15BqI6h



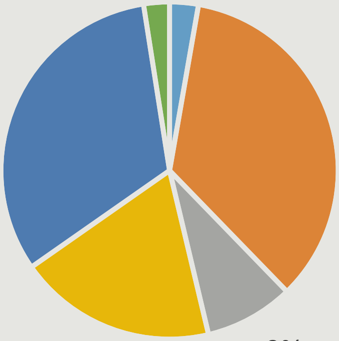
Facebook Polls

What Is Your Browser's Homepage?

If you've ever wondered what other power users have their browser homepage set to, wonder no more. Here's what some of our Facebook fans use, with the #1 choice going to Google.com.

Julian Mazzitelli: My own custom page with a random Nat Geo image and all my favorite sites.
Matt Janosko: **www.google.com/IG** is still alive and well, contrary to what Google says.
Kelli Sheppard: About:blank
Chris Anderson: Google Chrome plugin "Currently"
Mason Salsbury: My homepage is my "most viewed" tab.
Clay Brewer: Reddit, xda developers, and MaximumPC.com
Foster Angelo: Yahoo.com; it was around before Google.
Juan Trujillo: Reddit and Facebook are all I need
Mike Sova: Restore Previous Tabs
Darren Hill: I have six tabs set to "home page"
Dave Brown: Bing.com
Tim Verry: Opera's Speed Dial
Laurence Battenfield: "Open where I left off"
Anthony Alexander: I'm home-page-o-phobic
Robert Stewart: Zombo.com

What PC Component Gives You the Most Trouble?



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THE BUILDS



BASELINE



PERFORMANCE

BASELINE — INGREDIENTS

PART			PRICE
Case	Corsair Carbide 200R		$60
PSU	Seasonic M12II 650W	NEW	$85
Mobo	Asus P8Z77-V		$165
CPU	Intel Core i5-3570K		$220
Cooler	Cooler Master Hyper 212 Evo		$30
GPU	MSI Radeon HD 7870 GHz Edition		$210
RAM	8GB Corsair Vengeance DDR3/1600		$58
Optical Drive	Samsung SH-224BB		$18
SSD	Samsung 840 Pro 128GB		$130
HDD	1TB Seagate Barracuda		$70
OS	Windows 7 Home Premium 64-bit		$90

Approximate Price: $1,136

PERFORMANCE — INGREDIENTS

PART			PRICE
Case	NZXT Phantom 630		$175
PSU	Cooler Master Silent Pro M2 850W	NEW	$120
Mobo	Asus Sabertooth X79		$325
CPU	Intel Core i7-3820		$290
Cooler	NZXT Kraken X40		$90
GPU	Sapphire Radeon Vapor-X HD 7970 GHz Edition		$420
RAM	16GB Corsair Vengeance		$100
Optical Drive	Asus BW-12B1ST		$60
SSD	Corsair Neutron GTX 256GB		$200
HDD	3TB Seagate Barracuda		$135
OS	Windows 7 Professional 64-bit		$140

Approximate Price: $2,055

OUR BASELINE build represents the minimum level of performance we'd accept on a semi-strict budget (by our gearhead measurement, at least). This month, we wanted to upgrade to an AMD Radeon HD 7870 XT for a graphics boost, but we haven't gotten hands-on yet. The Samsung 840 Pro is our favorite SSD, hands down, and the 128GB version is surprisingly affordable at just over $1/GB, so we're sticking with it for the time being. RAM prices continue to creep up, so we switched our PSU to the Seasonic M12II 650-watt to help bring the system price back down. That's less wattage than we were getting from the Cooler Master Silent Pro M2 720W we used previously, but 650W is plenty, even if we eventually add a second video card for CrossFire.

FOR THE Performance build, we upgraded from Intel's Ivy Bridge to its Sandy Bridge-E platform, where we have more PCIe lanes for multiple video cards, and a socket that should see Ivy Bridge-E CPUs through 2014. The Core i7-3820 can overclock using gear or strap ratios, despite not having the "K" that indicates an unlocked clock multiplier. We thought about upgrading the CPU cooler to something with a 240mm radiator, but we wanted to keep the budget under control.

The Cooler Master Silent Pro M2 850W is a good buy at $120. It's a 100W boost over the Corsair HX750 we used previously, and it costs about the same. It's a lot of power, but we'll need the extra juice if we decide to add another AMD Radeon HD 7970 down the line.



ULTRA

AT THE ULTRA tier, money is of no concern, so we upgraded our case to the Corsair 900D. We love the Cooler Master Cosmos II that has been part of this build since we started this column, but it can't mount a 420mm radiator, and we want that option for the future. The Cooler Master Silent Pro Gold 1,200W is a 150-watt upgrade from the Thermaltake ToughPower Grand we were using, and it's about the same price while offering comparable quality and features. We also updated the CPU cooler from the Corsair H100 to the H100i since it produces less noise and lower temperatures, and offers software control over pump and fans speeds.

On the GPU front, we considered swapping the GTX 690 with the slightly faster Radeon HD 7990, AMD's new flagship dual-GPU card. But at press time, the card was still experiencing frame-latency issues, and the company only had a "prototype" fix for it that wasn't final. We're confident AMD'll lick the problem eventually, but it's hard to say when, so for now we'll stick with the GeForce GTX 690.

INGREDIENTS

PART			PRICE
Case	Corsair 900D	NEW	$350
PSU	Cooler Master Silent Pro Gold 1,200W	NEW	$200
Mobo	Asus P9X79 Deluxe		$375
CPU	Intel Core i7-3930K		$550
Cooler	Corsair H100i	NEW	$100
GPU	Asus Nvidia GeForce GTX 690		$1,000
RAM	16GB Corsair Vengeance		$100
Optical Drive	Asus BC-12B1ST BD-R Burner		$60
SSD	Samsung 840 Pro 512GB		$475
HDD	Seagate Barracuda 3TB		$135
OS	Windows 7 Professional 64-bit		$140

Approximate Price: $3,485

For more of our component recommendations, visit www.maximumpc.com/best-of-the-best.

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www.arctic.ac



CPU COOLER
Phanteks TC14PE
$85 (street),
www.phanteks.com



BOOKSHELF SPEAKERS
Audioengine A5+ $400 (street),
www.audioengineusa.com

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